

RECORD

Bldg. 207

107-601

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“*What is the best way to get rid of a bad habit?*”

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2022-2023
2023-2024

Journal of Health Politics, Policy and Law, Vol. 32, No. 4, December 2007
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212A. 2nd

J.R. Fosberg

Collection and Field Note Book

No. 67
(Feb. 15, 1963 - March 20, 1963)
(43404 ----- 43570)

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Mr. La. 2nd

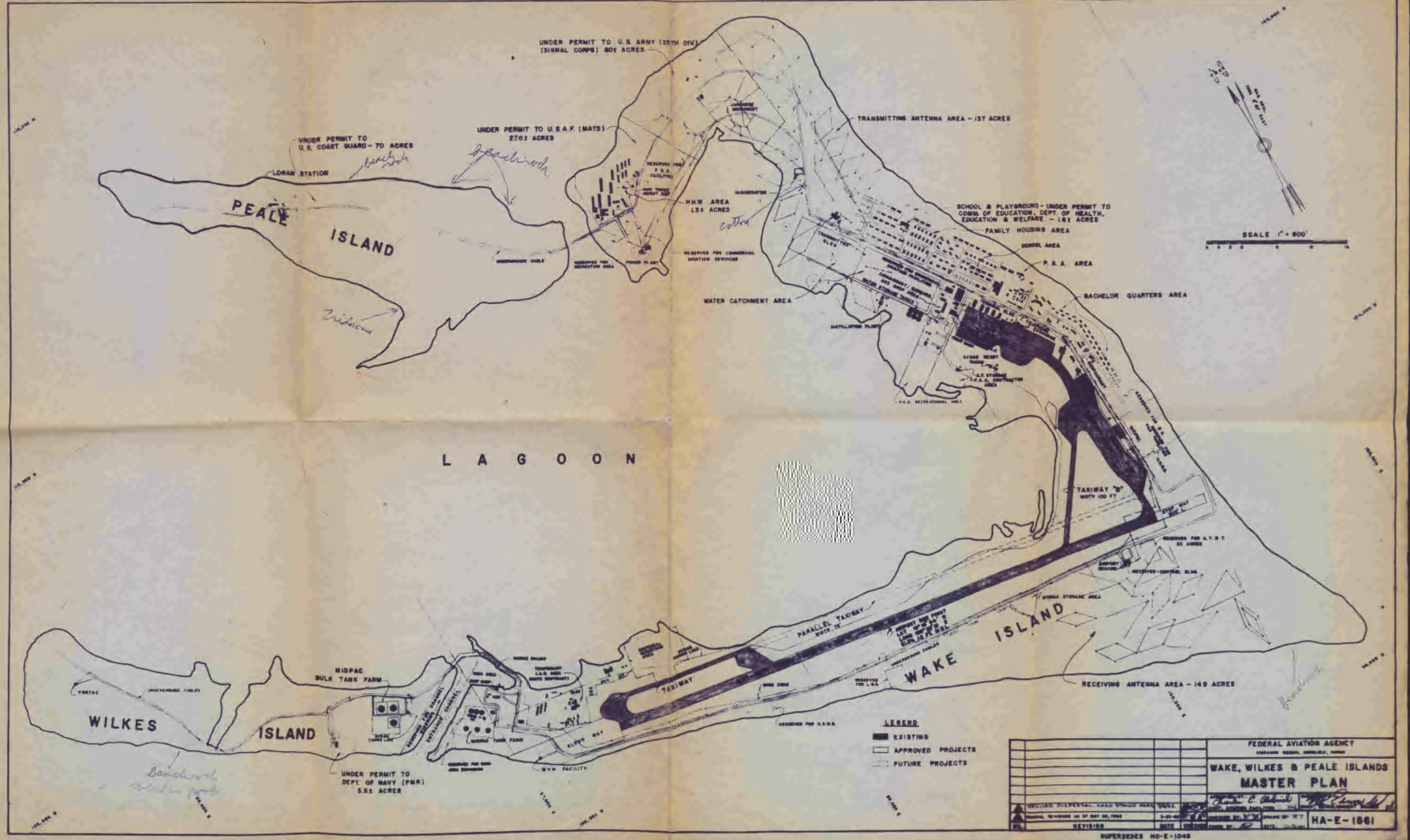
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Book # 67



Standard
miniature blank

PLANTS OF THE HAWAIIANS.
OAHU

Lonicera japonica

Locality 2 mi.
Calif., north of Turlock,

Stanislaus Co.
not spread but is many years ago
Date 3/19/63
Coll. F. R. Fosberg

Alt. 35 m
No. 43553

Remarks Tangled climber, sterile at this season

return

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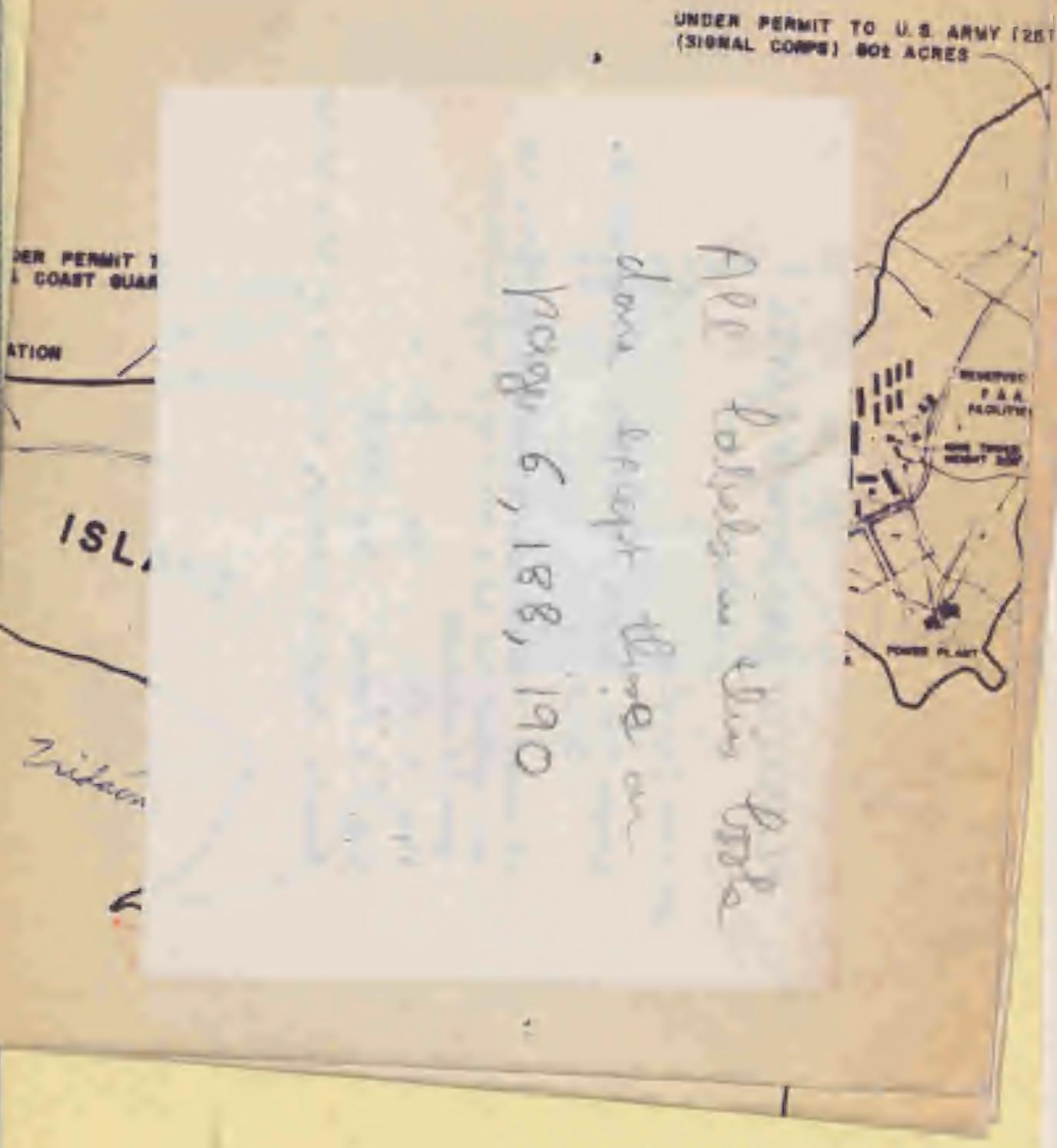
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1903 California

1

Feb. 15 - Trip by car - Hayward
to Turlock -

Hills bet. Hayward and
Tracy are green.

In Tracy area apricot
orchards in full bloom.

Feb 16 - return to Hayward -
Area between Hughson
and Ceres but just south
of each, is almost entirely
a mosaic of orchards and
vineyards - with a few
open fields - with some
cottonwoods, locust, Melia,
Washingtonia, olive, evergreens,
and Eucalyptus around
houses.

Orchards are mostly
peach, pruned to a very
definite height, perhaps
12 ft., with branches curving
downward at tips. Grapes
are either staked up and
on wires or pruned back
to erect trunks. There are
some walnuts, either as
orchards or rows along the
roads.

Out of Modesto on Paradise
Road - orchards dominate
until Sunland (?). Here is a
slough (or the Tuolumne R.?)

with large trees - not mostly *Populus*. *Choradendron* very prominent.

From here a mosaic of open land and orchards probably generally more open land till crossroad Paradise - hilltop rd.

From here scarcely any orchards. On left sloughs & trees, much *Choradendron* alternating with pasture & cultivation. Then low, dark gray soil. San Joaquin bottom lands. To rt. higher, very open large fields. all cultivated.

To Hwy 132 land is lower, drainage ditches, tendency to be marshy.

Left on Hwy 132 - all cultivation, ditched. 3 mi. to San Joaquin R. becoming more marshy to river. Along river are sloughs with trees - talus, *Populus*, *Quercus*? etc. Considerable *Choradendron*. Marshy land mostly pasture.

West of river is both pasture & cultivation all open, to Rt. 33. Rt.

on 33 to Tracy.

The land is higher, but possibly still originally marsh. One deep drainage ditch.

A few orchards toward Tracy - apricots, blooming. A young walnut orchard, just planted. A few rows of walnut trees along road. Mostly cultivation in large fields, shallow roadside ditches. Area on rt. is flat. Tracy + Rt. 33 is low, flat, all cultivated. Probably would originally have been marsh.

The rivers - San Joaquin, Tuolumne & Stanislaus, are all flowing with considerable volume of water, and are all very mushy - not overflowing in spite of heavy recent rains.

Center strip on rt. 90 mostly has a hedge of oleander.

Feb. 17 - St Lucas Valley
 Partially denuded hills,
 with patches of woodland
 and, in western part,
 of chaparral. Flat
 valley bottom with
 thickets and patches of
 wood-Umbellularia (with
 noticeable weeping habit)
Quercus (*wislizenii*?), *Talis*
 5 b/w photos near head of
 valley - chaparral with
 Umbellularia in ravines.

Immediately over
 summit are *Pseudotsuga*,
leptosperma, ~~*Pseudotsuga*~~
 these becoming abundant
 down the canyon toward
 Nicasio. *Arbutus*,
 Umbellularia.

Cop in valley bottom
 above Nicasio, where there
 is a beautiful grove of
 sprout redwood.

Near Nicasio reservoir
 a slope, mostly grassy has
 a series of large sloping
 terraces - on the seeps
 are patches of *Comandra*.

In a wide ravine is a
 patch of *Talis* sp. with
 some *Rhamnus californicus*.

Baccharis pilularis is
 scattered on slopes.

Canyon below Nicasio Res.
 is densely wooded with
 Umbellularia. One local
 slope shows very striking
 grooved wind-shear. (photos)

Below this the valley
 bottom filled with talus about
 4-5 m. tall, catkins just
 coming out. This and
Aesculus are bare. The *Acacia*
 is rare, scattered in the
 Umbellularia. Some *Quercus*
wislizenii.

Fairly extensive salt
 marsh at head of Tomales
 Bay. Slope of Inverness
 Ridge above bay densely
 wooded. Much building
 along road, even out into
 salt marsh.

Point Reyes - peninsula bet
 Drakes Bay and ocean,
 mostly grassy & pastured,
 rocky knobs with of light brown
 partly grassy, partly
 covered by a thin scrub
 of *Lupinus arboreus*
 (photos) - long strips of
 dunes & soft back of
 beach, with *Lupinus* & *Baccharis*.

A little grassy slope
rocks, some sand
florula arctopoides
Luzula

Nemophila menziesii v. atomaria
Luzula

Claytonia

Polygonum californicum

In flower Phacelia insularis v. continentalis

Taraxacum

Douglasia, Sphaeralcea, Bupleurum

Lomatium nudicaule

Berberis aquifolium (pinnata)

Crypsimun

Arnica discoidalis

Oenothera ornata

Phacelia californica

In a sheltered slope
some sizeable bushes
of Berberis in the Lupine
scrub.

Catkin

Feb. 17 - Point Reyes hills ~~south~~
north of lighthouse back
from coast, Marin Co.

43404 Berberis
" very local on slopes
away from sea

1 15 Phacelia insularis v. continentalis
rare, in grassy places
around rocks or hilltops

stiff compact shrub 1 m. tall,
leaves stiff; flowers yellow.
flowers rose-color

8

1963 Guam

Feb. 22 - Arrived on Guam at about 9:20 a.m. The aspect of the island from the air is definitely green.

Superficial impressions from driving around central part of island - Tumon Bay, Agana, Barrigada College of Guam, Harmon Village, etc.

Leucaena is about as luxuriant as ever, but tips of upright branches or stems are bare, for up to 5-6 dm. or more, lines made.

Antocarpus - many trees had small branches beaten off and the aspect of the plant very ragged, but small leafy twigs appearing in abundance.

Ticus - branches beaten off, larger ones with an abundance of small sprouts. Many of the trees little more than the complex trunks with shot sprouts.

9

Coco - most trees still standing but looking very beaten up, a few snapped off, quite a few blown over. Some look as though they had been attacked by Oryctes, but this not conspicuous. Anderson, agricultus dept chief, said that although a few trees look this way no beetles have been found.

Ochrosia - many small trees seen but none seemed to show any typhoon effects. Fully leafed out.

Premna - only one tree noticed but this showed no signs of damage.

Morinda citrifolia - fully leafy, showing no obvious effects of typhoon.

Hibiscus ornamental hybrids - leafy and blooming vigorously.

Thespesia populnea - one or two small plants seen, fully leafy.

Herbaceous ground cover is fully as luxuriant as normally, especially

common components are:
Bidens leucantha, most
conspicuous roadside
species, flowering abundantly.
Sophium halapense, very
common, flowering.

Chloris inflata common
in grassy places. also
Pleuris indica

Pennisetum setosum
locally abundant in
Harmon Field - Harmon
Village area, fully
covering ground.

Lepidium occasional,
not showing any typhoon
effects at all.

Pisonia grandis
trees near hospital
have all small branches
broken off, sprouting
abundantly from trunk
and larger branch stubs.
One tree lying down
sending up sprouts.

Pandanus in forest
mostly showing
no apparent effects -
fully leafed out. But
in some patches of
woods are many that
broken off.

The general aspect of
the forest north of Harmon
field is ragged but
certainly green

Anderwald says that
after the typhoon it rained
hard for about 4 days.

Casuarina equisetifolia
ragged looking, with tips
of branches dead but
all large and medium
even many small branches
sending out small bran-
ches with abundant
photosynthetic branchlets.

Delonix regia were defoliated
but have recovered ~~fully~~
partially to almost wholly.

ac. stone -
Not a leaf left after explosion
except palms + Pandanus
which were shredded.

Leucaena started to
become green again
within two weeks.

Artocarpus was by far
the slowest to start to
put out leaves again.

Few Pandanus were either
snapped off or tipped over,
but some were.

Plants seen
Phyllodendron cf. *bipinnatifidum*
Dombrya spectabilis
Nopalea cornifolia

Buddleja asiatica - road
below west gate of Nagapura
along ditch. Fair colony -

orange leucos (flame)

Feb. 23 - Trip Agaña - Piti - ap
Yumatac - Meis - Mariana -
Talofofo - Yona - Tinian - Agu

At ^{asan} a casuarina with
only a very slight develop-
ment of new branchlets,
others on landward side of
Asan Point scarcely at all
damaged.

Theeseria and other beach
trees, incl. *Pithecellobium*
defoliated, many tipped over.
Refoliation not far advanced
on *Pithecellobium*, but well
advanced on *Theeseria*.

On Cabras Island *Pluchea*
~~st~~ indica is abundant. *P.*
odorata occasional, hybrid
several colonies - depressed.
On seaward face of island
is *Ipomoea* zone

- o *Pluchea* indica
- c *Capparis* costifolia
- a *Pemphis acidula*
- ~~*Liptena* argentea~~
- o *Callicarpa canescens*
- o *Achyranthes velutina*
- o *Ipomoea pes-caprae*
- o *Clerodendrum inerme*
- o *Fesaenda laevis*
- a *Ipomoea tuberosa*

all on rough limestone
but the *Pluchea* not only on

disturbed areas. Here also
Fimbristylis cymosa abundant.

On exposed sloping faces
several m. above s. l. the
plants were apparently
cut down to woody bases,
but are now ~~now~~ sending
out new branches.

Laccopium spontaneum
one sterile clump on
breakwater beyond end of
Cabras with the *Pluchea*

Battered forest on limestone
near base of Cabras
with *Xylocarpus*, *Theeseria*,
Ficus, *Artocarpus mariann.*
Pipturus - all recovering
vigorously - the *Artocarpus*
slowest.

On ridge beyond quarry
Pipturus is dominant,
dead parts dead, vigorously
sprouting from bases
trunks.

Beyond Cabras, toward
Ortg, are thickets or forest
of *Pithecellobium*, some trees
toppled, most of them
battered, but mostly well

leafed out.

Fruit vines of palm

Mangroves - some killed - one area counted, of tall stems 1/4 live, 3/4 dead, these still standing.

Many have been knocked down and are dead. No mosquitoes.

A patch a little farther away seems mostly living.

The leaves are mostly on the upper branches.

A small patch of mangrove at corner of former Lipu Harbor are more alive than dead.

At Agat, but along beach some *Lamanea*, this dead but abundant small leafy branchlets.

Breadfruit trees on waist strip tipped over but sending out some branchlets.

Some on landward side of road standing but small branches mostly removed, abundant small branches.

Most of toppled trees pointing south, incl. a number of coconuts.

One coconut snopped off top Bangi point on flat at top of beach several partly topped *Pithecellobium* are partly dead, but many branches green and sending out tiny leafy twigs.

Faci Point - rain - storm - waterfall everywhere from here south, water from sword-grass areas ~~are~~ very clear.

Coconut trees in valleys look very peculiar south to Umatac look very peculiar - many old leaves hanging on and small curved leaves.

At Merizo and east many *Artocarpus* knocked down, still sending out sprouts - also *Pithecellobium*. Trees in general here look battered but leafy. The mangroves very little affected.

Crowns all have lower leaves partly brown some have inflorescences

Small mangrove stand east of Aga Pt. trees to 7 m. completely unaffected by the storm.

Rhizophora mucronata + *Bursera gymnorhiza* about equally dominant both flowering, fruiting, but not abundantly. *Scoparia distichia* flat with several *Averrhoa* seedlings.

The *Coccoloba* on the south coast is not nearly as battered as in the central part of the island. Probably still retains old green branchlets.

Many trees, especially *Pithecellobium*, are down but may be from 1957.

Near Aga Pt., many more trees are broken and knocked down.

North of this some coconut down, but standing ones not much damaged. Young ones seem more tipped over than tall ones.

Fantane is becoming abundant in flats between Aga Point and Marajan.

In Merizo bananas are a bit taller than elsewhere (to 2 m.) one bunch of fruit seen.

Coconuts up along east coast are rather sparse and battered looking. None seen down except for a patch, about half way bet. Marajan and Talofopo where most of the trees are down, but possibly not.

Trees more and more battered toward Talofopo and especially on the hills just south of the bay where everything is ragged.

At Talofopo Bay the waves apparently knocked the Hibiscus and jacaranda down to about 5 m. inland from the road. These trees are putting out leaves again, even those that are down.

The ridge along the stream is somewhat battered and broken but not more than bent over. At Marajan

it was even less damaged.
North of Talofogo in the next inlet much cal. boulder size was thrown up across the road. Much damage to trees.

Toogche - Casuarina forest along beach still standing but rather thin-looking

Coconut plantations more and more battered northward, but hard to distinguish between the typhoon damage and previous bad condition of the trees.

Feb. 24 - above Harmon Fields some *Ostrosia* rather battered and defoliated, recovering, some scarcely affected.

Notes on weeds -
Paspalum fimbriatum is generally scattered around the island.

Emilia javanica is common on roadsides around south end of island.

Bidens leucantha is extremely common on roadsides and waste places, at least as far south as Talofogo.

None of the common weeds seem to have been adversely affected by the typhoon. Some may have benefitted.

Many *Pithecellobium* tapped over, but mostly sprouting green twigs.

Alocasia macrorhiza - fully normal in appearance.

Pennisetum purpureum has become very abundant all over north and west parts of plateau.

(to p. 52)

22

1963 Guam

Feb. 23 -

east of Merizo
on sand flat just back of
shore, dominated by *Paspalum*
distichum

+ means
widely scattered
+ means short
scrubby

43406 (grass)

6 locally common

2 07 *Avicennia*

rare on wet sand

~~BB~~

1 08 *Gomphrena*
common weed in lawn

Feb. 23 - breakwater just
beyond Cabras Island
on coral gravel fill

6 + 09 *Pluchea odorata* x *indica*
several clumps,
growing with both parents

* 10 *Pluchea odorata* (L.) Cass.

~~occasional~~

3 + 11 *Pluchea indica* (L.) Less.
abundant

Feb. 24 - Tarague Beach

2 12 (algae)
abundant on rocks between
tides

(*Cladophoropsis*
Enteromorpha)

det Doty

to p. 30

23

1 m. small tufts, culms ascending
to erect.

0 m. 2 seedlings, less than
70 cm. tall, ~~seen~~ only, seen.

90 m.

depressed, heads white.

4 m.

much branched,
conspicuously depressed
shrub; heads purple.

erect shrub; sterile
at this season. leaves grayish green,
shrub 0.5 m. tall, erect.
leaves bright green.

Feb 24 - Campanaya Bay
 Forest on slopes along road have many partly bare trees (photos). The terrace shows little evidence of recent damage but back of the depressed coastal area are many beaten down bare shrubs.

Along the coast to the north the front of the taller scrub appears brown (photos).

Below the cliff is a good "worn-algal" bench (photos). (tide going down, will be low in 2 hours at apx H.)

Photos of *Zygia tenuefolia* patch on terrace just back of cliff edge.

Scrub forest on the terrace is mostly Mammea in outer 50-75 m. This is entirely browned, but many dead leaves persist. A few green branches in sheltered places.

Inland the forest becomes mixed with *Ochromis*, *Pennantia asiatica*, *Aglaias*, *Pandanus tectorius*, *Grimia*, *Pisonia*, *Cyass*. Ficus protea &

The Mammea is less damaged here, but still predominantly brown. Some trees of short kinds are down. The cycads have lost lower leaves but still have good crowns. *Ochromis* seems little damaged.

About 100 m from base of cliff *Triplolea* becomes abundant.

Epiphytic *Pyrosia* seems unaffected.

Liomia, here as well as on the slopes, is very much eaten by caterpillars. Leaves are lacy.

Sporocarpa (or *Stictocardia*?) and *Fлагellaria* are common vines.

Outside this forest *Haematoxylon* is killed back extensively from tips but bases and protected branches are alive.

The Mammea in the edge forest is leafless and is dead from 70 to 100 cm. back. Some saplings dead to base, even where sheltered.

sample 1. "Worm-algal" terrae
(photos of rim) (sample
of rim rock) very
well developed here,
perhaps at mid tide.

sample 2. Some samples of rocks
surface between terrace
level and inner part
of notch - a rough surface.

4 Samples of rim of
flat bottomed solution
pools well above ht
but in spray area.

Deposits of debris
back 50-75 m. from
edge of cliff face show
that waves came over them
10 m. cliff face.

sample 5 ~~for~~ rock surfaces from rough
pitted limestone about 10 m. up ^{to}
along east coast road ^{ex.}
Pandanus tectorius forests
show little or no effects
of typhoon except a few
trees blown down at edge
along road. Where there
are *Artocarpus Elaeagrus*
trees there are badly bent
up small branches has
been whipped off. The
cycas have no old leaves

Tarague Beach -
Coconut trees are perched
on root mounds
and debris has been washed
up to at least 100 m. back
perhaps 150 m. back of
shoreline. Some coconuts
snapped off. But it
is possible that some
of the exposure of
coconut roots dates
back to 1957, as the
roots are quite dry
and old. Several uprooted
Ceruaria trees have been
thrown up to 5 m. or more
on the rocks. (10 m. I leveled by RFG.)

At about low tide
level is a small
exposure of white
reef rock erosion ravine
cut in a much greater
exposure of so deeply
pitted reef rock. This
darkly stained by algae,
deeply notched intertidally,
with rough surface
conformable to just about
2 m. above m.l.t., this
levels precisely with
mushroom rocks and
other exposures well
out on the reef flat.
Abasive material abundant

enough on the lower
~~as~~ ramp to keep it
white for a while, but
Enteromorpha or Cladophora
is gaining a foothold
on prominences. At least
a few inches of material
has definitely been
removed from beach,
probably more,
and if the root mound
are contemporaneous much
more, at least a meter in
place.

Forest back of beach
is battered and defoliated

Along the beach to the
westward is a good
example of the 11 foot bench,
both against the foot
of the cliff and especially
around the bottom of a very
large mushroom rock.
This rock is the size of a
small room, perhaps 5 m high,
very deeply notched at
the 11 foot level. It appears
to be a fragment that at some
past time fell from the
cliff. Though at the time
it was observed it had
not rained for at least
12 hours, water was dripping

from the top of the notch.
Small stalactites
had formed and a
heavy blue-green algae
deposit where the water
fell, showing that
the rock stores an apprecia-
ble amount of water.

This rock ~~as~~ suggests
that the 11 foot bench could
scarcely have been a
Pleistocene phenomenon, as
the rock in which this
notch was cut could
scarcely have been
in this position that long.

The 1 foot remnants,
also, suggest that they
were probably not
that old, as they would
be pitted much more
deeply than they are
and would scarcely
preserve any aspect
of a 6 foot surface.

30

1963 - Guam

Feb. 24 - Campanaya Bay

43413 *Spermacoce*
common along roadsides
in Leucaena thicket.

6 +14 *Ipomoea trifolia* ^t *trifolia* L.
common along roadsides
in Leucaena thicket.

3 15 *Fuscinaria* *Sarcocornia*
common in tide pools
on "wurm-algal" terraces

6 +16 *Itenotaphrum micranthum*
small patch on ^{(Dew.) Hoh}
edge of Mammes forest, on
rough limestone.

1 17 *Aporobolus*
very local on rough
limestone just above
spray zone

1 18 *Euphorbia*
rare in pits on limestone
terrace just above
spray zone

1 19

1 20

20 m.

20 m.

1 m.

10 m.

5 m.

5 m.

0 m.

0 m.

31

Twining in bushes,
flowers dull rose-pink,
open at 10 a.m. closed at 12 noon

prostrate, forming a
loose mat.

dense tufts, leaves
glossous beneath.

milky; glands greenish

Feb. 25 - Lates Point,
north of Lagos Bay

Forested cliff and
terrace -

Cliff had a full
canopy of *Pisonia* and
Cynometra - this was
opened up by typhoon.
The cycad, very abundant
here, was not defoliated
though acc. stone, elsewhere
they lost all their leaves.
Momordica and *Physalis*
are abundant here now
but were not ~~seen~~ present
before.

The *Pisonia* here
has unusually long
stipes. *Intsia* is very
densely leafed out.

On the terrace many
trees are still leafless -
probably *Mammea*.

Feb. 25 - Lates Point, north
of Pago Bay (College of Guam)
Forest on steep limestone bluff

413421 *Achyranthes*
occasional in forest opened
up by typhoon

3 +22 *Morinda umbellata* var. *glandulosa*
common

3 +23 *Clerodendrum inerme*
occasional

1 +24 *Pyrrosia lanceolata* (L.) Farw.
common on trunks of
Cypress and other trees

80 m.

Feb. 26 - Y Piga Conservation Area.

in tangled forest of *Pandanus*
and *Artocarpus*, badly
battered by typhoon

8 +25 *Pyrrosia lanceolata* (L.) Farw.
epiphytic on tree trunk 1-3 m.
from ground

1 26 *Taeniophyllum*
rare, epiphytic on tree trunk

2 27 *Asplenium*
occasional, epiphytic on tree trunks

4 +28 *Polyodium punctatum* (L.) Sw.
occasional, epiphytic on tree trunks

11 29 *Nephrolepis biserrata* (Sw.) Schott det.
abundant in ground layer

stem ascending

- twining, tangled vines;
flowers white.

- low shrub; flowers
white with purple
stamens and style.

~~*Pandanus coriacinus*~~

160 m.

elongate rhizome surrounded by
a dense mass of
fine roots, creeping on
tree trunks; blade leathery,
aerial roots pale green, flattened.

- flowers white.

fronds thin, pendent.

large clumps, not
forming very regular
rosettes

"¹⁹⁷⁶Janett fronds erect.

Data from air photos

Ritidian Point - Feb. 19 1963

The vegetation shows little or no evidence of disturbance or reasonably low oblique except for some possibly defoliated trees on the terrace below the road on cliff edge. This is not at all obvious. Beachwood strip to northeast of point seems more clearly visible in these obliques than in a vertical strip of same

region taken Feb. 21 (V13086, Feb. 63) 01092
JAP-CI USN 13-37N 149°5' E

These verticals, about 1/5 scale, show much more evidence of defoliation but no real signs of extension, breakage or windthrow. This strip is very clear. The canopy trees, very largely defoliated, made very poor

W 1963 Journ

Vegetation types -

Leucosia - generally
the whole mass is bent
over somewhat, to as much as
45°. The tips of the branches
are leafless, the lower parts
densely leafy, with tangled
stems.

Hibiscus tiliaceus forest
tends to be blown in one
direction and even more
tangled than normally,
leafy but less so than
normally.

Pandanus forest -

1963 Guern

Feb. 20 - 1963
Boga Conservation Reserve.

Large breadfruit (same one on a transect in 1967) and others in the neighborhood have lost all smaller branches (or where some remain they are dead) but first & second, rarely third order branches are putting forth, leafy twigs. There are more than a few cm long from Pandanus knocked down broken just at or below the top of root cone.

Aglao mostly bare, beginning to leaf out.

Asplenia shows little effect - has bright green leaves, few broken branches.

Canopy has been almost completely destroyed and a thick ground cover about 1 m. tall of Carica seedlings, Nephele viscosa with scattered other plants - saplings of Aglaia, shrubs of Muntingia, Desmodium, Triphasia, Eugenia, vine such as Lagellaria, Ipomoea indica (photos - first two under)

Many other trees knocked down, with many ~~other~~ epiphytes on fallen trees and branches.

In small road running thru reserve, as it goes up the hill in places the majority of trees had been knocked down, all pointing west or south of west. These included some large Astrocaryus, some Asplenia, many Pandanus

from p. 34

+ 43430 *Marytonus thompsonii* (Merr.) Frob.
common in undergrowth

7 + 31 *Mikania micrantha*
common.

2 + 32 *Dentella repens* Forst. f.
common on bare hard red soil

Feb. 27 - Ritidian Point

at top of cliff, on limestone

5 + 33 *Melothria guamensis* Merr.
in open ground at side of road

3 + 34 *Capsicum frutescens* L.
common on edges of thicket

2 + 35 *Wilkesia elliptica*
occasional on cleared roadside
(seedlings common in forest)

4 + 36 *Melothria guamensis*
occasional in forest

same - on lower terrace

8 - 37 *Ixora triantha* Volks.
common in undergrowth
in forest on limestone

same - on sand flat back

5 - 38 *Portulaca*
common

Feb. 27 - Northwest Field.

west side

3 39 *Spathoglottis plicata* Bl.
occasional on open grassy roadside

scrambling, sparsely
branched shrub, fruit
reddish, aril white.
very prostrate, fls. white.

160 m.

vine; flowers white,
fruit green, fleshy.
shrub 1 m. tall; flowers
greenish white, fruit green.
shrub 2 m. tall, with
unpleasant odor when
broken; sterile.
vine, flowers white.

35 m.

shrub 3 m. tall, fruit
bracts pale at base;
fruit green, as many as
c-8 in a head.

200

m.

prostrate, fleshy,
flowers yellow, petal notched
at tips, stamens 10-14,
flowers closing at about 10:30 a.m.

160 m.

erect, flowers magenta.

(to 1+8)

Feb 27 - Ritidian Point

On slope to south all large trees are bare but the understory is fully green.

Ficus on rampart is bare, coming back slowly.

On plateau the canopy is very thin - *Pisonia* is lacy from being eaten by insects. *Premna* is fairly leafy.

Outside very leafy, also the two trees of *Kentia*. *Macaucanga* is well leafed out. Ficus mostly still bare. Many other trees bare. *Pandanus* uncommon here, but seem in good shape.

Beach below Ritidian Point waves obviously washed up to base of cliff! breaking. The *Tournefortia*, so young, coconuts, etc. in the outer edges of the vegetation at back of beach. Much debris in coconut grove, small trees bent over but few large trees down back of this or lower rocky ground the forest of *Hernandia*, *Ficus*, *Aglaias*, *Lippia*, *Sapindus*, *Pithecellobium*, *Mariannensis*, *Premna*, etc., badly

battered, but no tree seen ~~now~~ ^{Pisonia} almost completely depoliated by caterpillars. *Mammea* completely depoliated or leaves dead. General direction of fall - bending of trees is east to west (on north coast. (photos)

Denuded ground around old installation had
Thuraea
Bidens
Cenchrus echinatus
Zornocarpus pernambucensis
Lepturus repens
Fimbristylis cymosa
Chloris inflata
Wedelia

First terrace above the flat back of beach - canopy is destroyed - *Ficus*, *Pisonia*, *Mammea*, are almost completely leafless. *Pandanus*, *Ochnosia* not badly depoliated. *Barringtonia* somewhat depoliated.

In understory - *Cycas*, *Aglaias*, *Vipharia* not badly depoliated. *Cocca communis* up in abundance. Seedlings of *Barringtonia* also abundant.

+ same terrace a bit south of Rituday St.

^{photos b/w} ^{end} Ficus both defoliated, the Pinus by insect (beetle collected on leaves, may be responsible) *Ochroma* & *Gmelina* not much defoliated. *Quamnia*, *Cyca*, *Morpho*, *Pitca*, *Melanolepis*, *Cestrum* all in understory not badly defoliated.

Ficus in this area seems to have been defoliated, then put out bunches of ~~the~~ slender twigs 10-20 cm long, which have then been dried up and lost their new leaves and are largely dead.

Clearing about 1 km from town - mostly a solid stand of *Bidens* with some patches of *Lobelia campanuloides*. Down on terrace at base the forest has a considerable proportion of defoliated trees. One *Heilaea*(?) straight down half way to cliff.

Amanates Point - a number of *Casuarina* blown over to west, near top of cliff.

Ficus beaten up, defoliated, except in ravines

Some *Pandanus* blown over locally all either uprooted or broken in root one - only one tree seen broken off above root.

Numerous swiftlets around steep cliffs, overhangs, & caves.

A tremendous shaft drilled in the limestone just back of cliffs, connected with a cave or crack in an indentation in cliff.

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1963 Guam

Feb. 27 Amantes Point

43440+ 4 Hedysotis foetida var. mariannensis
in thickets at top of cliffs

Feb 27 - Ritidian Point

1 41 Eugenia
rare in forest on rough
limestone

Feb. 28 - Togcha Bay

7 42 Euphorbia heterophylla
abundant in disturbed
ground near road

Feb. 28 Ylig Bay

1 43 Turbinaria ornata ^{Kuetzing}
Also Tannia tenella plants cast up on beach

2 44 Sargassum

plants cast up on beach

1 45 Hedysotis
on rough limestone rocks
in spray zone2 46 Phyllanthus amarus?
on rough limestone just
above sea

Feb. 28 - Pago Point

3 +47 Physalis angulata
roadside5 +48 Physalis lanceifolia
in cultivated ground

Feb. 28 - Pago Bay

2 +49 Euphorbia chamaissoides Bas.
in gravel at top of beach

110m.

150m.

5m.

0m.

0m

1m

1m.

40m.

1m.

49

shrub 1 m. tall; flowers
white.

small tree, sterile.

erect, stems fistulose
and woody, bracts yellowish
at base, not at all red.Also Turbinaria turbinata,
Sphaeralcea tribuloides Meneghini
Erodium Erodium(great masses of floats form
windrows at high tide mark)
fleshy, corollas white,
lobes narrowly oblong.
(note long fruits).corolla pale yellow, green center
surrounded by brown, anthers bluish.
sprawling, sparsely branched herb; corolla
white with green center, anthers bluish.leaves white beneath, involucral
glands green.

Feb. 23 - Agana Swamp
A number of fairly large
trees uprooted along the
south margin of the swamp.
Trees fell to east.

Sinajang - *Pithecellobium*
trees badly broken, some
uprooted.

~~East~~ of Pago River -
Small strip of Nypa along
banks of river - older
leaves mostly either broken
off or if still standing,
almost dead. New ones
coming. Strip of Phrag-
mites, Nypa, Avicettia and
Rhizophora + Bruguiera
separated from w. bank
has the Nypa leaves broken
and all the mangroves
dead except a tiny clump
near ~~the~~ highway that
still have some leaves
near the tops, one or two
other trees still show some
signs of life. Many of
the dead trees are still
standing, some broken
off. Of still living trees at
least one is Bruguiera and one
Rhizophora apiculata. The
west bank of this channel
is a tangle of Hibiscus tiliaceus

mostly beaten down and
half broken, ~~but~~ but very
leafy.
(B & W. photos of mangroves
begin roll 3)

Shore of Pago Bay,
about ~~near~~ middle, is a
steep beach of small
pebbles, lined on lower
edge with *Passalum*
distichum, upper slope
with old coconut trees,
these on rounded root
masses 0.5 to 1 m. high,
packed with pebbles.

Apparently these are
the result of earlier
typhoons, but there has
been some minor exca-
vation around these recently.

The strip of dense
Passalum sod along the
bottom of the storm beach
is definitely pre-typhoon
as are various *Leverreauxia*
and *Tournefortia* bushes
that have tops battered
and are sprouting from
bases. There is some
burial of bases of *Leverreauxia*
at top of storm beach
by loose pebbles, but
not very significant

Notes on weeds (td)

Mikania micrantha
has become widespread
seen at Ylig, Sinajena
Tago, Ninety Hill.

Bidens lencantha has
reached at least as far as
Yogya Bay on east coast.
At Ylig it is growing with
B. pilosa. *B. lencantha* is
not abundant yet ^{over} widely
on this side much south of Yogya.

Where the two grow side by side
they do not look conspecific.

Leaf shape & margin are
not the same, the *B. lencantha*
being predominantly trifoliate
and finely and bluntly serrulate,
the *B. pilosa* 5-foliate, sharply
serrulate, leaflets longer, more
pointed.

Heliotropium ovatum var.
depressum (but not very
depressed) is a pioneer on
gravel either exposed or
deposited by typhoon - is
very abundant.

1963 Guam
(from D. 51)

The *Leveraena* here shows no more damage than in upland. Probably waves here had relatively little force. Some plant debris up to 11 ft. above water-line.

Pago Point - The *Leveraena* in exposed places is bare much farther back from tips, here to 2-3 m.

Physalis lanceolata has white flowers with greenish centers, bluish anthers. *P. angulata* yellowish flowers with greenish center ~~surrounded~~ with bordered with brown, bluish anthers.

Yona - Most larger trees except a few cocohuts have been sadly battered and trimmed back to large limbs.

Ylig Bay - broad sand flat back of beach - a thin layer of sand has been spread over this. Waves have washed inland almost 200 m.

Part of this was covered by *Leveraena* scrub, which has been bent inland. Bare sand has a good stand of *Stachytapheta* in flower. Locally *Phragmites* must be coming up through a layer of sand probably from a buried layer of rhizomes - culms very slender, less than pencil, to 2 in. tall, beginning to flower. (Photos of bent down *Leveraena* scrub).

¶ Beyond Togcha River - *Casuarina* grows on sand flats back of wide beach - The sand overlies rough limestone terrace - one part has had more sand piled on it - some trees broken, some bent inland, mostly some sand has been removed (photos).

Patch of *Leveraena* almost completely destroyed, a few sprouts from base (photos).

In the tallest casuarina forest a foot or so of sand has been removed, exposing white rather rough limestone. On this an abundance of Wedelia seedlings, some 1 pinnules per. capitis, some Euphorbia characiasis, some Lepturus and a broad-leaved grass. Scaevola & Vigna in sand pockets. (photos) Calliandra.

On sand pioneers are Scaevola, Wedelia, Thespesia, Ipomoea per-capitae, Lepturus,

Casuarinas on the rock flat have root systems extensively exposed. Trees look battered but recovering. Some on sand have been blown down. Some broken off.

Tournefortia battered, some blown down but sprouting (photos)

Hibiscus tiliaceus blown down to almost prostrate but leafy (photos).

Upper

Beyond Jones Beach an area of great of Artocarpus, Hernandia, Pandanus

is very battered, only main limbs of Artocarpus, Hernandia left, sprouting leafy twigs in abundance, esp. the Hernandia.

Cove beyond this just before going around point to Tolofos, has much boulder rubble but this must come from road repair. (photos). A beautiful crescent beach (photos) with curved beachrock. Traces of 3 terraces and notches on point.

On point is open scrub forest of Barringtonia asiatica, Guettarda, Tournefortia, Thespesia, Hibiscus tiliaceus, Cycas, battered almost still leafless. The Tournefortia, Cycas, and Thespesia are coming back fastest. Shrub layer of Calliandra, some Caparis, etc. still almost intact, and a little Allophylus & Eugenia renovation.

The amount of washed debris piled in this forest shows

that wave surely came
over it, perhaps from above
~~or~~.

Trees for about 1 m. are
dead or all the trees.

Mammes on bluff
back of road is brown,
almost leafless.

Ornamental & fruit trees.

Cocos nucifera

Few trunks snapped - more trees uprooted, but a very small percentage. Very many have broken leaves still hanging vertically. Almost none have any nuts, even small ones remaining, though new inflorescences are beginning to appear.

Delonix regia.

Smaller branches are dead at tips, new foliage appearing in abundance, shape is generally preserved. A few are uprooted or partially so.

Samanea saman.

Defoliated but new leafy twigs are coming out on all but the smallest branches. Shape preserved very well.

Hibiscus hybrids -

so completely recovered that it would be difficult to know that anything had happened.

Verticella merrillii

Show no apparent effects of typhoon.

Cassia fistula

One tree seen, this badly broken.

Plumeria rubra

Temporarily defoliated, but no other effects, except some trees partly tipped over.

Adenanthera pavonina

One tree seen - defoliated but recovering without apparent damage.

Tectona grandis

Small and medium branches torn off but trunk ~~broken~~ and large branches sending out abundant vigorous leafy branchlets.

Phyllanthus acidus (1-10-12 pairs of alternate ovate glabrous leaflets) almost completely unaffected by storm.

Persea americana

smallest twigs dead only.

Annona squamosa

No apparent effects on small tree.

Casuarina equisetifolia
Generally stood up well -
lost smaller branches and
all of the needles, putting
out new ones in abundance.
Where on shallow sandy soil
some tipped over "broken" or uprooted
or broken off one 7dm. dbh.

Artocarpus altilis on漫生的
Generally lost all medium
and smaller branches, and very
slow to put out new leafy
twigs. Some large ones tipped
over. ~~This~~ Root systems
of those tipped over are very shallow.

Araucaria heterophylla
Green but branches
more or less broken off

Mangifera indica
small branches broken off,
many leaves on main branches.
Others with dead smaller branches
leaves on large.

Erythrina variegata v. *ovata*
leafless but putting out new
leaves, not obviously damaged.

Cespa
Some branches broken off.
no leaves.

Roxburghia oleacea
~~floriferous~~ left but
otherwise intact.

Carioc papaya
most large trees are
broken off great ways up
and are sprouting from
the stump.

Terminalia catappa
all branches broken off
but now sprouting,
sprouts are up to 1.5m
4 internodes.

Pithecellobium dulce -
many trees broken
and uprooted, but sprouting
vigorously.

Citrus - some tipped over,
some rather burnt back
from tips, some not much
burnt.

Musa spp.
These shoots were killed
to ground, but now are
mostly 1m. or more tall,
one or two seen with bunches
of young fruits.

Mar. 1 - along east coast road

Mixed forest with *Artocarpus*, *Pisonia*, *Ficus*, *Pandanus*, *Ochroma*, etc.

Baddy battered, canopy almost destroyed, many *Pandanus* knocked down, broken at or below the top of the root zone.

Artocarpus bare except for clumps of new leafy twigs on trunks and large branches.

Ob. Mammea - rather small trees, mostly defoliated but with some green leaves still, not brown as on cliffs.

Mimida citrifolia seems scarcely to show any effects. *Ochroma* in very good shape.

Cypris abundant here, many up to 4 m tall, all have a rather sparse crown of leaves.

Pisonia with leaves badly eaten; perhaps by a green geometrid caterpillar (collected)

Chrysophyllum and *Juglans* are partially defoliated but recovering.

Locally more *Pandanus* down

than standing - many uprooted

Large *Inertia* (photo) and small *Iernia*, as well as *Ochroma*, seem severely affected by storm.

Ground is covered by *Nephrolepis* and some *Polypodium*, *Scolopendra*. Small patches - tufts of *Pennisetum setosum*. One *Terminalia catappa* at edge of wood seems scarcely affected.

Momordica is very abundant at edges of forest and in openings and here and there generally.

A series of four photos of this forest (to about no. 32 on roll 3). Kodak first 6 on roll 3.)

Across road the land has been cleared with a bulldozer, leaving a few trees, mostly *Artocarpus* standing. These were badly hit by typhoon, many knocked down - all pointing south. (Photos b-w - end roll 3, 1st.) Soil here is thin & bright red, friable.

Anao-mati Reserve
 Canopy of forest completely destroyed. Many tree down. Fairly Pandanus is broken off above root crown, generally below, or uprooted. Ochromis either uprooted or scarcely affected at all.

Inselospis uprooted, also Hibiscus tiliaceus either bent down or uprooted. Emanea broken off. Ficus standing but small branches gone - tufts of leaves on broken branches.

The forest generally is a great tangle, many trees down. Several mannonea broken off. More Pandanus down than standing, many broken off above root crown. One large Pandanus dubium seen - broken off above root crown.

This forest about as bad hit as anything seen on islands so far. Bidens leucantha very abundant in paths and openings.

Mar. 1 - east of Barrigada on
East Coast Road.

43450 *Berberis*

" in open bulldozed clearing
5 + 51 *Polygala paniculata* L.
common along roadside

5 52 *Achyranthes*

common in edges of thickets
and in cultivated ground

Mar. 1 - 2 miles north ^{east} of
Campanaya along East
Coast Road

3 53 *Cyperus ligularis* L.

occasional along road
in edge of forest.

Mar. 1 - plateau back of
edge of cliff between
Anao and Mati Points

7 + 54 *Hyptis spicigera*

common in semi-cultivated
ground

1 55 *Taeniophyllum*

common on fallen trees

3 56 *Citrus bergamia*

rare in forest along trail

Mar. 2 - road from Nimitz Hill
to Mt. Aluton & Mt. Teajo

5 + 57 *Sorghum halepense* (L.) Pers.

common locally on roadside

120 m.

prostrate, stems red; leaves
dark green above, white beneath,
flowers pink.

roots with wintergreen odor;
flowers white.

sprawling sparingly
branched herbs.

160 m.

120 m.

plant erect, aromatic, to
1 m. tall; corollas blue.

roots green, flattened to trunk.

small tree; fruits immature,
spherical, aromatic, said
to be inedible but used
for washing hair.

260 m.

small tufts, erect.

In Guam Market

gomodice

*Solanum lycopersicum**Allium cepa* wa - pit*Capsicum frutescens*

Guavabily manoy, habba,

*Cucumis sativus**Citrullus**Ipomoea batatas**Araea**Phaseolus vulgaris**Vigna sesquipedalis**Solanum Melongena**Lactuca sativa**Zizyphus**Raphanus sativus**Colocasia* (taro, arrow)*Ipomoea aquatica**Prophorcarpus tragonotoma**Beta* (chay)*Brusa* (fl. bread)
(cut up and cooked with meat)

72

1963 Guam

Mar. 2 - Cotal Conservation
area, east of Apia Heights,
in savanna on hills of
red volcanic soil

160m

43458 *Thelypteris*
3 in small wooded ravine

4 59 *Timonius*
common, edge of wooded ravine

1 60 *Timonius*
common

1 61 *Timonius*
common

1 62 *Timonius*
common

2 63 *Timonius*
common

1 64 *Timonius*
common

4 65 *Timonius*
common

5 66 *Melastoma*
very common

2 +67 *Glochidion Marianum* M.-A.
occasional

2 +68 *Trenguetia mariannensis* Merr.
rare

73

shrub 3 m. tall, fruit green.

shrub, fruit green.

shrub, fruit green.

young plant 0.8 m. tall, sterile.

shrub, sterile.

sapling, sterile.

shrub, ripe fruit black.

shrubs 0.5-1 m. tall; flowers
white, bracts subulate
to narrowly boat-shaped.

shrub; flowers yellow.

vine climbing, closely adherent
to Pandanus tree. fruit reddish
when ripe.

May 2 - Coral Reserve

No apparent general erosion or enlargement of erosion scars result of typhoon. Any difference would only be detected by careful measurement.

Much damage by driving jeeps around area.

Melastoma has been conspicuously the killed distally but sprouting below. Several other shrubs - *Geniostoma*, *Myrtella*, *Dekaspermum* etc. show some dead branchlets, but in general there is little effect of the storm. Some of the *Casuarinas* have broken branches, but generally they show no damage at all, except perhaps some sparseness. Mat of needles beneath, generally well rotted, esp. in somewhat protected spots.

Melastoma has white flowers, subulate to narrowly boat-shaped bracts.

all *Sianella* seen have white flowers.

Gleichenia is first colonist in some erosion scars, but *Stachyphylax* is occasional.

Some fair sized *Casuarinas*, but not very tall, occurrences very patchy.

Plants seen in eroded areas, not in rain forest.

Timonius glabrescens
Hippodium scandens
Dekaspermum fruticosum
Scavoia

Gleichenia
Thielanthus
Myrtella

Wikstroemia
Melastoma
Geniostoma

Cassytha
Helicia (Diplacrum)

Casuarina

Drimenia
Spathoglottis

Pouteria ferruginea

Miscanthus
Glechnum
Machaerina

Phyllanthus suffodi
Diodella ensiformis
Chrysopogon aciculatus
 Flagellaria
Hypoxis capitata
Pomoea littoralis
Stachysaphetum junc.
Centella
Waltlia
Lacistema
Lycopodium cannum
Nephrolepis

Tasmannia, seems to be
 hairy when seedlings and
 to become less so as it gets
 older.

Pouteria bushes show
 every gradation from glabrous
 to golden sericeous.

Pandanus, large trees,
 in ravine forest, broken off
 above root cone, pointing
 south.

Upper zone
 well
 mixed
 Melastomaceae

Plants in ravine forest
 patch

- *Pandanus tectorius*
- ✓ *Cananga odorata*
- ✓ *Melastoma*
- ✓ *Scaevola*
- ✓ *Lygodium scandens*
- ✓ *Pouteria ferruginea*
- ✓ *Scleria sp.*
- ✓ *Hibiscus tiliaceus*
- *Morinda citrifolia*
- ~~Cat's Bleeding~~
Blechnum
- ✓ *Glochidion manianum*
- ✓ *Geniostoma*
- ✓ *Griseocinetis*
- ✓ *Hedyphtis*
- ✓ *Leptolepis*
- ✓ *Phyllanthus suffodi*
- ✓ *Zizipharia*
- ✓ *Carraria*
- ✓ *Myrsinella*
- ✓ *Wikstroemia*
- ✓ *Cyathia*
- ✓ *Misceanthus*
- *Premna*
- ✓ *Varallia*
- ✓ *Hypoxis capitata*



Mar. 2 - road up Minuity Hill from Piti - Apia area.

Casuarina 10-15 m. tall lining this rd. show severe defoliation - some trees do not seem to be putting forth any green branches at all, some are a little green, others not seriously damaged. same is true of those on road to Abuton & Tengis, but most of these seem nearly or quite dead. This seems generally true, but the effects are very localized - trees side by side show very different amounts of damage.

Tips of Miscanthus are dry and brown.

Mar. 3 - Tamuning

Beach in front of Brown House has been somewhat eroded and of Thespesia and Pandanus & driftwood was removed about 3 m. - is gradually extending again. Lime tree tipped over.

Tumon Bay - north end Fafai Beach
all large *Pithecellobium* uprooted. Some coconut uprooted or partly toppled.

Coconut trees mostly have a few very short leaves now, some old dry ones hanging vertically. Were, as owner, normal leafy trees before typhoon. Those close to cliff are still in good shape. Also a patch just back of beach are almost normal.

Bet. Fafai and Gognga beach forest is somewhat battered, esp. *Artocarpus* trees. Pandanus is still dominant, undamaged except a few trees uprooted.

Bet. Gognga & Nam beach forest on the limestone bluffs is *Artocarpus*, *Pandanus* (both), *Ficus*, *Ochroma*, *Hernandia*, *Sennar*.

As usual the *Artocarpus* is most damaged and the *Ochromis* least. *Hernandia* has small branches nipped back but is sprouting vigorously. *Pandanus* not much damaged here. This part rather protected.

Large open flat back of beach here - possibly from sand excavation.

Bidens leucantha, *Coupea canadensis* very abundant, also *Paspalum*. ~~Many~~ other plants killed in ~~here~~. The areas with *Bidens* are generally high enough not to have been inundated. The *Paspalum* flats are low and moist.

Remains of *Bidens*, *Asclepias*, etc. apparently killed by salt water.

A low beach ridge in front of salt flats has *Sporodes peruviana*, *Fimbristylis*, *Thunera*, etc. and some very young *Bidens*. Some *Paspalum* here.

Areas of *Acacia* & *Lantana* scrub rather battered.

Gognga Beach has large *Barringtonia*, *Fernandia*, and *Thespesia*, as well as *Cocos* and *Pandanus*. These are not battered very much, except that one *Pandanus* is broken off above the root cone. *Fernandia* has lost smallest branches.

At foot of cliff set. gognga + Prator beacher and large *Barringtonia*, *Thespesia*, + *Tournefortia*

green acc. louder

Plumeria did well
Delonix did well
Mangifera (broken but survived)
 Royal palm mostly went
Pithecellobium (broken badly)
 clump palms went
Calophyllum inophyllum
 1/3 of trees uprooted
 acc. louder.

Anacardia occidentalis
 larger ones badly broken

Trenia bicolor

Mammillaria fasciata
Ranunculus tubiflorus
Adiantum trapeziforme
Dianthus caryophyllus
Leteraisis purpurea
Chlorophytum comosum?
Epidendrum (red + rays)
Crossandra undulata
Heliconia (very slender, rays white)
Dombeya spectabilis
Anthurium andreanum
Costus
Emilia sonchifolia
Dieffenbachia seguine
Asparagus sprengelii
Caryota mitis
Lepidium virginicum
Nephrolepis cordifolia
Pilea (large, like microphylla)

1963 Guam

Mar. 14 - Helicopter trip - 9:00 a.m.

Forest on w. slope Barrigada Hill battered and depoliated but few trees down.

Coconut plantations w. of Barrigada Hill & n. of Harmon have very few trees down. Patches of forest in this area again good shape.

Bright green sheds no mudroches.

Forest near Harmon V.H. are in good shape. Not so cliffs w. of it more depoliation & less in Amanrao Pt. Coconut plantations below Amanrao ~~w. of~~ are badly battered.

Forests on Tumon, at north end many broken trees, less in central part. ~~some~~ some coco down near beach, none inland.

Forests at Agana and below hospital are very depoliated - now more than generally so far also on top near hospital.

Very good forest on island off Tumon Bay, not much cliff top. Tumon Bay damage mostly lava.

Fort Rose V. forest badly damaged, trees down pointing inland. Bluffs & slopes of Mount Hill badly battered.

Much bamboo in ravines in grass area of Nimitz Hill. Caigua vines locally much burned, no pattern.

Mangrove swamps in rather bad shape at head of Apra Harbor.

Pencaena looks "combed". Pointing south and west around Apra H. at Fort Pen. Trees on rocks at tip mostly down. Little damage as less depoliation on foliage. Cypress enormously abundant. Dominant so lush canopy is opened as never.

Carefully in background to uproot, but still completely ineffective. Apra coverage is freedom. Cypress on Fort Pen.

Base of Fort S. is almost all Pencaena.

where not open.

Agot & I., up river
Sarawak.

Ravine forest on w. slopes
not in bad shape. but
very local. Many scars,
but not many of them
broken. no obvious
new soil in w. slopes.
large broken trees in the
valleys, mostly Pandanus.
much defoliation esp. on
upper slope.

Forest on Almogora and
Samlam. has larger
trees very bare. but
almost none broken.

Ravine forest of Lamay
on w. slopes show much
defoliation, some broken
tree. Southward, along
Inland ravine forest bark
battered.

Mangroves around Merig
untouched.

Photos of Mt. Schneiders.
Coconut - lone tree here
much debris inland ab
Casuarina dry at tips.
(photos).

No visible effect on Merig
reef. Entire Merig coast
lined with low mangrove.

Very little notable
effect on coastal strip,
except a few coconut
down and some browning
of leaves.

J.S. Cally - not even
much defoliation or
dead tips. Water in
ravine. fresh grass
not effected.

Browning in ravine
but toward ~~Sundaya~~
Apie trees very in
ravines toward ~~Zapaga~~.

But Hibiscus fruit shows
little or no effect.
Inland from ~~Sundaya~~
much damage and
coconut ravine - much
battering in trees across
~~the~~ ~~the~~ Tolls.

Large areas scar
in Van Dan area. look
quite active.

Some battering in w.
exp. Pandanus on
both bank of lake -
Tolls damage
long trees known
Talokoff Tolls. Large tree
smaller branches. some
defoliation, especially upon
tree on hill of
mangrove on the river

North side of slope
draining has not
been
much more battered.
Most trees still have
North of Talofogo Val.
the main forest is
gray brown than green,
but still few trees
down, down, not many
broken.

On Rift mammals
is bad, Talofogo north,
Bash of together there
are thousands of small
trees (Loradene?) blown
off pointing S. E.

Cross tree near Yana
scarcely have been.
Trees also Loradene
only appearing at tips
except locally on
hill just S. of road
well above river when
quite gray.

Bamboo thickets
S. of Yana & many tangled
but green.

North this is common
in lower West Valley
most Loradene & brown
only bare tips above
it is open.

Down River trees
in cliff area N. of
Collegiate Forest nothing
like this devastated
in 1950.

Platocarp forest with
abundant red sugar
of remains of canopy tree
little breakage.

Is some clumps
northward no breakage
here, only partial
deforestation.

Widely scattered on plateau
more breakage, more
Loradene about
(Andrea Cenozo. C.)

Brecher tree front west
forest becomes gray
northward, L. of
Barangada hill.

No canopy left here.
Around Lands Road
bare means for lumber
removing some.

N. toward Lands Road
wood less deforested
still some breakage
but due to cutting of
soil.

W. of Lands Road -
canopy gone, quite &
open broken trees remaining
soil. More broken tree

northward all points south.

Anas-Mal. Area lots of broken tree remains w. & s.w. Forest generally flat generally, grayish, down on cliff and terrace.

Some broken trees s.e. of Santa Rosa but less.

Cross lot toward N.W. field ridge area. Cactus down locally growing s.w. Many broken in forest all points south.

Breets live locally near bottoms, many tree down pointing so & s.e. Defoliation less than s.e. of Santa Rosa but still very serious. More tree down here than elsewhere (in n. part of lot)

Less broken tree but still more s.e. of dragon mostly points south

more toward N.W. F. best less.

In N.W. f. only a few trees down, smaller growth "combed" & ant.

Plateau land of Ritudia. It has canopy opened, trees all balled up, rather few tree down. L. of Ritudia almost no tree down,

southward becomes greener, along m. side of N.W. f. field, still much defoliation. Smaller veg. "combed" southward.

L. of N.W. f. a few trees broken, all toward south.

Trees in much better shape around canyon entrance here defoliation & breakage on cliff.

Height of trees a little breakage to south but foot is green with "combed" to south.

Rubbish breakage south of the road from S.

Luxcoene "coronata" sp.
• s.w. Hains 7

W. of N.A.'s Agave
forest along the slopes
is open little vegetation,
some broken or down trees,
steep cliff, pointing S.

18' 46.

Photos available

NAG off Agave no
Central Chilina file.

Euniphis

10 Jan. 61 8 frames
15 Mar. 61 3 frames

Elato

no date 21 frames
6-5-61

15 March 61 6 frames

Taravulay

no date 3 frames
but rephotograph

Gaberut

no date 4 frames
15 March 61 1 frame

rephotograph, closer.

Ifalik

15 March 61 5 frames

Hamotreh

6-5-61 4 frames
15 March 61 3 frames

but rephotograph

Maqur

17 March 61 2 frames

Loc. Olimarao

no date 6 frames
6/5/61 2 frames
15 March 61 3 frames
rephotograph

Pikelot

no date 5 frames
15 March 61 2 frames

Pisauir

17 March 61 7 frames

Putap

no date 5 frames
6-5-61 3 frames
17 March 61 3 frames

rephotograph

Putusuk

6-5-61 2 frames
15 March 61 3 frames

and ~~one~~ series marked batavai in tattooed foot

Putuwat

no date 17 frames

6-5-61 2 frames

15 March 61 3 frames

~~West Farg~~

~~St. John's~~
~~inches~~

Ulul

17 March 61 5 frames

Namonyuit Atoll

mostly poor - rephotograph

West Farg

21 Oct 54 4 frames
but rephotograph

Woleai

no date 33 frames

no date over are all
marked HOG.

rephotograph, Batawa!

Cards. Arbury

Mar. 3 - Agana Heights
planted in garden

243469 *Jasminum*
2 70 *Cassis glaucescens mattenii* Benth.

3 71 *Justicia*: sp. *spicigera*

1 +72 *Garcinia mangostana* L.

1 73 (grass)

2 74 *Senecio conpesso* Britt.

2 75 *Cydisia*

2 76 *Gaillardia*

2 +77 *Crescentia alata* HBK.

3 +78 *Parkinsonia aculeata* L.

2 +79 *Cryptostegia grandiflora* (Roxb.) R. Br.

2 80 *Clerodendrum bungei*

1 +81 *Guaiacum officinale* L.

1 +82 *Pittosporum tobira* (Thunb.) Ait.

3 +83 *Malpighia coccinea* L.

50m.
50m.

— scrambling shrub.
shrub 1.5 m. tall, with
disagreeable odor when
broken; flowers yellow.
— loosely branched
shrub; flowers scarlet.
shrub 1.5 m. tall, sterile;
(recovering from typhoon);
petioles purple.
— used in flavoring meat.
creeping or scrambling
herb, rays orange to scarlet,
disk orange,
woody vine, with
strong garlic odor when
broken, flowers lavender,
flowers maroon with
orange mouths.
tree; original ones brought
to Guam by Hafford;
flowers said to be very
ill-scented. "cross tree".
— small tree; flowers
yellow.
climber, flowers ^{as} lavender
sap milky.
leaves maroon-purple
beneath, buds white.
— small tree; sterile.
shrub; odor very oily
and unpleasant when broken.
shrub 1 m. tall, fls. pinkish,
white.

98

1963 Guam

43484 *Jasminum multiflorum*1 85 *Juniperus*3 • 86 *Lantana sellowiana* Link & Otto2 87 *Lantana camara* f.2 88 *Lantana camara* f.1 89 *Hansevia*2 90 *Jasmenum*4 • 91 *Thunbergia erecta*2 • 92 *Zoysia matrella*
forming lawn

Mar. 3 - Nimitz Hill

3 93 *Pinus luchuensis* Mayr
single planted treeMar. 3 - Piti, near
old agriculture station site4 94 *Eugenia*?

99

shrub, flowers white
fragrant.

- glaucous, shrub 2 m. tall

- purchased as "mortale juniper"

- depressed aromatic shrub,

- flowers purple.

- low shrub, flowers
white with yellow eye.
fruit lead blue.~~leads~~ shrub 1 m. tall,
flowers orange turning
scarlet.- leaves erect, mottled;
fruit, with one locale
developed, two not,
immature.- semi-scandent;
flowers white.- shrub to 1 m. tall,
corolla tube and throat
yellowish, limb deep
purple.- dense mat, rather
bumpy.

170 m.

tree 5 m. tall, 2 dm. thick
near base. trunk gray-brown,
scaly.

20 m.

large old tree, trunk
1.5 m. thick; leaves without
odor or pellucid dots; sterile.

Mar. 3 - Agana Height
43495 *Taeniophyllum*
on trunk of *Crescentia* tree
in garden

Mar. 3 - Gognga Beach,
Tumon Bay
+ 96 *Stictocardia tiliaceifolia*
common back of beach

Mar. 3 - Mason Beach,
Tumon Bay

+ 97 *Paspalum setaceum*
common locally on
bare coral sand

March 4 - Orote Point

+ 98 *Desmanthus virgatus* (L.) Willd
locally abundant on
cleared limestone flats

+ 99 *Sporobolus*
occasional at edges of
rough limestone cliffs

50m.

roots flattened, green.

2m.

(Desr.) Hall climbing in trees;
corolla purple, stamens
unequal in length,
anthers white, some-
what falcate but not
at all ciled; stigmas
capitate.

1m.

depressed tufts,
culms spreading.

60m.

suffrutescent herbs
up to 1.5-2 m. tall; stamens
white.

dense tufts, leaves
pale, glaucous beneath.

1963 Guam

Mar. 4 - Orote Point

High limestone point with a ragged rim. On rim is *Phyllanthus mariannus*, and on top of cliff, *Sporobolus*. Entire top has been cleared and is overgrown with *Sesuvia* except where is grass.

Below cliff is an island with forest that has scrub forest that is brown, probably Mammea.

On a shelf at foot of "Spanish Stairs" has coconut grove, a pond with algae below tree.

Mar. 5 - trip to south end of island -

Head of Apra Harbor - the mangrove swamp had some trees still alive but many are down.

Casuarina around Roxas village as scarcely damaged.

Hibiscus forest near Agat is a tangled mass with many broken trees.

Agat - fallen tree pointing south, four of this, most are south, but a few going north. Then a number of Pithecellobium point west.

Near Faichi Pt. - a few casuarina and Pandanus are broken, pointing in various directions. Patches of ravine forest look rather devastated.

Ravine forest in Cetti shows little evidence of typhoon.

W. side of Mt. Schrock, grassy above, wooded below - one talus erosion scar well down on ridge to west.

Eichhornia in pool at mouth of Umatac stream flowering abundantly. The clumps

of bamboo are bent down somewhat to westward.

Seedlings on stone beach

- c Pemphis
- c Thuraea
- c Turnera
- n Sophaea
- n Vigna
- o Sennocratea tuba
- c, d, f, per-caprae
- a Scaevola
- o, d, c Lepturus

Cosos I.

elevated reef platform just above h.t. or perhaps at h.t. here mats of Pemphis, Sennocratea + tuft of Timbuctoo on a flat, somewhat irregular surface, apparently somewhat abraded, as the fritting is not sharp.
(photos here)

Stone beach above the platform has dispersed Pemphis seedling of Pemphis, Thuraea, Sennocratea per-caprae, Vigna, Lepturus, Turnera, Scaevola, Sophaea, Sennocratea, a few Turnera bushes.

The sandy ridge back of the main beach scrub badly killed back but abundantly growing from base, a few Turnera bushes. Some killed back and growing from base, and a sparse stand of Casuarina about 4 m. tall, upper part dead, sprouting from low, living trunks. A little Thuraea and Wedelia at edges of scrub; also some Lepturus.

Sporodes per-capitae, and
these not old plants.

Inland the Casuarina
is more abundant, taller,
less damaged. But when
it is sparse, even inland
the damage is severe.

Transect into Leucosia
scrub on cobble or boulder
ridge - Leucosia slopes
up - wind sheared on
outer slopes of ridge
where there is some
sand. Thinner forms
a thin ground layer
with occasional Euphorbia
cham. Many Leucosia
seedlings, *Lepturus* & *Fimbristylis*
~~and *Lepturus*~~. Inward, where scrub
is 3 m + tall there is
less sand, boulders
larger, less thinner
more Euphorbia, a few
scattered other seedlings
- *Morinda*, *Hedychium*, etc.
None *Cassyttha*, mostly
dead.

Leucosia gets more
- more tangled, - taller.
Many dead branches
but vigorous sprouting.
Very matted and
tangled inland, more

Morinda seedlings, a
few *Carex* seedlings.
Max. ht. 1 m.

Eastward on reef
platform *Pemphis* becomes
more abundant, covers
greater part of surface
except locally, locally
as much as 3-4 dm. tall,
^{wide} a few tiny plant of ^{1 m}
Basella *distichum*
and *Hedychium* *alliod*-purple,
here much less common.
Wedelia locally at foot
of storm beach, also *Lepturus*,
becomes common on inner
parts of platform, esp. where
there is some gravel, though
this may also accumulate
around *Lepturus*.

Near cross channel
the beach ridge curves
inward, and there
is a grove of Casuarina
on the flat, with *Lepturus*
between. Distal 1-2 m
of branches of Casuarina
are dead. None are down.
Some *Hedychium* here, flowering.
Pemphis generally flowering.

In cross channel on a few Rhizophora ^{Burmannia} seedlings 0.5-1 m. tall. several wading birds: tattlers, curlews, a dark-neck heron, fairy terns.
In outer part of channel, Pemphis scrub 1-2 m. tall, a very few small Casuarina, sprouting only from lower trunk; larger branches, large seagrass mats and patches of *Paspalum distichum* on cobbly or sandy places.
(b & w photos)

In interior of small islet are a number of Leucaena 3-5 m. tall, mostly partly broken & low, not floricing, fruiting abundantly. Habit not quite right for *L. leucocephala*.

Here many coconut trees are down, pointing south, many casuarin either uprooted or broken off 1-3 m. up, pointing in various directions.

Locally 1/3 to 1/2 the Casuarina stand are down.

Lawn of *Vitis* & *Lepturus* covering sand or bare soil, or *Paspalum* here & there in open places.

Toward east end now Casuarina down than standing. Thespesia not much damaged, except at tip.

Along lagoon beach many Casuarina are uprooted, pointing mostly inland or lagoonward, a few in various directions those uprooted are mostly completely dead.

Inland, locally, all trees are down, in other spots few. (photos of place where all are down b & w) (or b & w where most are standing - note branches along trunk)

Thespesia along beach mostly knocked down but still living - yellowish green.
(several b & w photos)

Larger Thespesia still standing but battered (photos)
(end both rolls along lagoon beach)

Along lagoon beach
as a whole many more
Carrionaria down than
standing. Few down
on seaward side.
Those standing,
Carrionaria & others
very badly scattered
along lagoon beach.

Samples

14 rock from seaward
reef platform.

Mar. 5 - above Merizo Annex
photos of Mt. Schroeder
conservation area from
Merizo annex water tank.

Appears to be mostly
Miscanthus with, perhaps,
some Dimeria on ridge. No Carrionaria.
At water tank *Glossygaire*
is colonizing bare soil - tuff-brain

A large fire has burned
over the peaks across the
valley to the right.

Ficus trees are almost
bare in rainy forest.
Some rainy forest
very brown.

Merizo - Inarajan
Pomoea crassulifolia
established east of Merizo.

Flats toward ~~Agafayon~~^{Agafayon Bay},
where brush is cleared
from under Carrionaria are
covered by Wedelia & *Portulaca*
persicaefolia.

Inarajan - Pago
Bet Trocha & Agafayon the Hernandez
trees have all large branches
covered with leaves, small

112

1907 Queen
over one open.

113

43 Mar. 5 - Cocos Island
 74500 *Leucaena*
 5 in forest in interior
 1 01 *Leucaena*
 common in forest in interior
 5 02 *Leucaena*
 common in forest in interior
 5 03 *Sesuvium portulacastrum* forma
 common on reef platform
 at about extreme high tide level
 3 +04 *Hedysotis albido-punctata* (Mun.)
 local at inner side of top
 reef platform under casuarinas

Mar. 5 - Merizo Annex,
 on background
 near water tanks, decom-
 posing tuff.

3 +05 *Glossogyne tenuifolia* Cass.
 common
 1 +06 *Phyllanthus simplex* Retz.
 rare
 2 +07 *Emilia sonchifolia* (L.) Dc.
 common
 2 +08 *Emilia javanica* (Burm.f.) Rob.
 common
 5 +09 *Heteropogon contortus* (L.) Beauvois.
 common

1 m.

— tree 1 m. tall, broken off by
 typhoon, completely dead.
 slender tree 5 m. tall,
 — flowers white, fruit immature.
 tree 5 m. tall, blown over
 by typhoon, immature
 fruits on sprouts from trunk.
 prostrate, stems green,
 leaves subglossy, some-
 what compressed; flowers
 pink.
 plant subflexile, stems
 prostrate to ascending,
 corolla white; fruit green.

90 m.

— stems spreading from
 a rosette; flowers yellow.

corollas bright rose pink
 (this plant looks a bit
 like a hybrid but probably
 isn't. Corollas are slightly
 longer than usual, bracts
 larger).
 flowers brick red.

Tufts; awns twisting
 when mature.

Mar. 6 - arrived 4 p.m.
n.e. coast opposite Pan American
area.

White stone beaches
of pebble gravel, inter-
tidal bedded of sandy
gravel.

A series of beachwash -
an older but poorly
consolidated intermittent
strip near low tide,
being ground by waves^(sample).
Above this a wide thin
apparently rather new
strip (about 3° dip) the
also being ground and
slabs thrown upon stone
beach. (sample).

Around terminal area
and among houses, on
leveled compacted soil, *Syzygium*, *Tropaeolum*, *Ipomoea*
are the commonest plants,
abundant ~~but~~.

~~Lepturus~~ tiny tufts
separated from each
other, and depressed.
Lepturus sparse, scarcely
fruiting. Small & medium
Bolakaria. This very limited
flora is very depressed
and trampled here.

sample

Mar. 7 - rented car (milege 49787.4)

Peclo I - *Lepturus gaspavense*
common all along road
as far as bridge.

Base of Flipper Point - a
dry channel almost
across the base of the Point
is washed, in places,
down to a hard reef platform
that is somewhat undulating
on the top surface. Over
this is a bed that is
mostly tightly packed
Nidaria shells with
considerable smaller
material, esp. the small
hair dark colored clam
(sample). In with these
shells are some coral and
fragments of shells, plus
very fine silt-like material,
this not continuous but
found here and there
in small bits.

Above the *Nidaria*
layer is a layer of
compacted sediments mostly
a mixture of sand and
small pebbles, 30-40 cm. thick.
(sample)

Much of the channel
bottom is covered by loose

Madacca shells and reef-rock boulders; in places embedded in sand. The sand is locally much compacted and encrusted on the surface by a layer of blue-green algal crust.

On point side of channel the sandy layer is much thicker.

~~Locality~~ is in the middle of it. 3 1/2 ft above tide at 1145 about 3 1/2 ft. below maximum elevation on Flipper Point is, locally, a putty-like bedded layer of clay-like silt, probably held by *Calymene* (sample) several cm thick.

Plots of layers on landward side.

Small *Pisonia* scattered in open ~~forest~~ *Tournefortia* woodland, flowering locally.

The herbaceous vegetation is mostly dry.

Wake I - near ~~old~~ Japanese Monument - under rocks - beetles, cockroaches, sawflies, isopods, a pseudoscorpion, ants etc. in a concentration. *Amaranthus dubius*. Patches of *Gossypium* scrub.

around old Japanese garden site

Cyperus rotundus

Catharanthus

Euphorbia glomerata

West end of Peale I.
About 5 acres - having
been bulldozed and
leveled.

This has come up to a
stand of seedlings of
Bursera - mostly
from 5 to 10 cm. high, a
few scattered ones up to
1 m. A few patches and
scattered tufts of *Lepturus*
or both, esp. a few mat
of *Coccoloba* and *Sporodesmus*
tubs, a few *Heliotropium*
seedlings. (photos)

Also occasional *Cortulaca*,
Eleocharis and *Lutes*.

On north side a broad
storm beach about ~~40~~⁴² to 50
wide of white large round
and pebbles, occasional
Tridacna shell.

Diverse population of
Lepturus repens, from a tiny
compact form with short
leaves and sessile spikes
to a much more diffuse
form with long-pedunculate
spikes. Also some

Peale I east of Jason
Sta. - low flat forest or open
scrub forest of *Bursera*
with patches of *Cyperus*,
Hydrocotyle and one of
Cynodon in openings.
A clump of *Vitis* and
one of *Thespesia*.
Patches of *Paspalum distichum*
and a large shrub, almost
15 ft. tall, of *Coccoloba*.
Eleocharis very local.
Lida occasional.

Peale I - west of buds, on
north coast -

A very diffuse form
of *Lepturus repens* is
common in deep ravine
not far from *L. gracilis*
and *L. repens* var. *sept.*

Beachrock exposure
is wider westward, but
a very rough dark upper
layer, then 1 to several
lower smoother light
gray layers extending
much farther landward,
apparently rather recently
exposed by high storm
waves. Is hard to the top,
at or sl. above high tide (not
leveled?)

Peale I. - base of
Flipper Point

The *Tridacna* layer, 18",
sample lies on a layer 10" thick of
sample sand and gravel which
lies on a hard irregular
bedrock surface which
slopes up from the
bedrock bottom of the
channel.

Actually this gives the
impression of an old
very gently sloping
erosion ramp which
runs along across the
base of the point. The
point may well be
a more recent feature, a
spit built out at right
angles to the shore.

samples

- 15 *Tridacna* shells from deposit on Peale Islet at base of Flipper Point.
- 16 *Tridacna* shell with material in which it is embedded, layer above no. 15
- 17 coral gravel from layer below #15, lying on bedrock
- 18 silty sand from between shells in layer of #15
- 19 bedrock under #17
- 20 compacted dry surface ~~sand~~ sand in channel at base of Flipper Point
- 21 exposed reef-rock in channel at base of Flipper Point
- 22 putty-like layer from base of Flipper Point.
- 23 small clams from *Tridacna* deposit (#15)

Mar. 7 - Peale Islet, near bridge

47510 *Lepturus repens* var. *subulatus* Fosb.
common locally in depressions

Mar. 7 Total Peale Islet,
Tokio Point
in cleared area on coral sand and gravel, beginning to be revegetated by *Tournefortia*

11 *Albuca platensis*
parasitic on *Boehmeria repens*

5 +12 *Lepturus gasparricensis*, Fosb.
common

1 +13 *Lepturus repens* var. *septentrionalis* Fosb.
common

Mar. 7 - Peale Islet, near Pepper Point
occasional in woodland

3 +14 *Pisonia grandis* R.Br.

Mar. 6 - Wake Islet,
near Terminal Area.

+15 *Blasiola & indica* (L.) Gaertn.
~~common~~ common on compacted trampled soil.

Mar. 7 S. Wake Islet
near ~~isopanax~~ monument

7 16 *Gossypium*
forming a loose, open scrub

creeping, forming a loose mat; spikes ascending.

- infected ~~pepper~~ stems
- erect, shortened,
- small bunches,
- culms ascending to erect,
- small tufts.

shrub 3 m. tall, flowers whitish, very fragrant.

low shrub flowers white with fine dark purple spots in center.

+43517 *Amaranthus viridis* L.
rare in open ground

Mar. 27 - Wale Islet,
near old Japanese garden site.

18 *Borrichia*

1 +19 *Cordia subcordata* Lam.
occasional in open scrub

5 +20 *Euphorbia glomerifera* (Willd.) Wherry
locally common, sheltered
places

2 +21 *Catharanthus roseus* (L.) G. Don
persisting locally

Mar. 27 - Wale Islet
near Japanese monument

5 +22 *Cendrawas brownii* ^{brownii}
rare on disturbed ground

5 23 *Puccinia?*
local, parasite on *Luffa* plants

R.M.S.

Mar. 28. Wale Islet,
old TAL compound
~~persisting from last~~

5 +24 *Phyllanthus amarus* Schum. & Thonn.
very local, but abundant
where found, around building

25 *Bougainvillea*
planted around house

stems and leaves light
green*
shrub 3 m. tall.

woody, ~~all~~ erect plants
5 m. tall; ~~fls~~ glandular
involucel glands white,
flowers magenta.

spreading much-branched
plant, mature fruit dark
purple.
causes normally prostrate
stems to grow erect.

bracts bright crimson red.

1963 Wake I.

Mar 8 - Wilkes I. Fulmer Pt.
 Broad reef flat with a small area of eroded beach rock and a great boulder field. The boulders, notched and gnawed are mushroom-like. A zone about 30 cm. ~~feet~~ low tide ~~high~~ is conspicuously chewed by fish (sample). The chewed zone corresponds well to the notch. Parrot fish and others seem biting occasionally, but not very often. Tops of Poitea colonies are much bitten in the dead parts, and in an inch or so of the living margin, in the "microtolls" colonies. The zone of chewing has a small Tetrapora-like growth along, but this extends a bit higher.

Soft corals of a number of kinds very common, especially near outer edge of reef.

The reef flat has limited coral growth with channels up to 2 m deep between masses of coral.
 Beach rock sample.

Large group of frigate birds, many males with distended pouches, sitting in *Tournefortia* trees. 3 red-footed boobies, probably young, in nearby tree.

Much bird life on Wilkes along road.

In cleared area at end of Wilkes is a ^{low} vegetation of *Portulaca oleracea*, *Lepturus eliotropis*, *Sida*, *Lepidium*, *Brenckia*, etc., a few scattered *Tournefortia* bushes (one small).

The pattern is a mosaic of patches of ~~other~~ dominant shrubs of each of these, especially *Sida* and *Portulaca*, and mixture of any combination of ~~the~~ others. The *Portulaca* and *Lepturus* reach 0.5 m. or somewhat more. The *Sida* is m. (orange fls. no red center). Both species of *Lepturus* are present.

This land has been recently cleared of *Tournefortia* (2-3 years ago?) some plants except *Lepidium* found under *Tournefortia*, but not in such numbers.

+ except where Turnepotia
is open

Coal Export Crf.
n. y. - yokohama

Birds - Wilkes (^{flying}
 2 white tailed tropic birds (Wilkes)
 3 red footed boobies (Wilkes)
 sooty terns (large colony on Wilkes)
 common noddy (a number
on rocks, Kubra Pt.)
Frigate Birds
 1 fairy tern sitting in Turnepotia
 2 red tailed tropic birds (Wilkes, flying)

Red footed boobies -
 about 10-12 pairs nesting
 in Turnepotia trees,
 young ranging full size,
 downy feathered out,
 possibly some eggs.
 In same trees with
 frigate bird nests.

Frigate Birds - 10-12 pairs
 nesting, eggs and
 almost grown young.
 Male sitting or soaring
 with pouches inflated.
 In same trees with red footed
 boobies.

Brown booby - 20+ pairs
 nesting on lagoon side
 of point, just back in
 vegetation & downy or
 with wings somewhat feathered
 out. Adult plumage dark
 reddish-brown on back.

At FAO Doshi
Stachytaphyta etc. *jamaiicensis*
 abundant
Heliotropium ovatum is
 still present, very ~~common~~
Croton brasiliensis common
 other weeds

Euphorbia glomerata
~~E. paniculata~~
E. cyathophora
Fimbristylis cymosa,
Cenchrus edentatus,
Euphorbia hirta
Pennisetum setosum
Pluchea odorata

Opp 7A L compound
Passiflora foetida
Casuarina equisetifolia
Carica papaya
Catharanthus roseus
Ricinus communis
Terminalia Catechu
Ficus carica
Cinnamomum zeylanicum
Gesnerobius niger
Stereocaulon purpureo
Rhoes sprattacea
Kalanchoe pinnata
Phragmites ^{argentea} undulata
Phragmites ^{argentea} vulgaris
Ansevieria guineensis
Bougainvillea

Leucadenia fencocophala
Pandanus tectorius
Thelesperma populnea
Cocos nucifera

Pond in angle of runway
 Vegetation of margins
 mostly *besuvium* with
 some *Fimbristylis cymosa*
 and *Lepturus repens*,
 with scattered shrubs
 of *Pluchea odorata* on
 slightly higher ground.
 Upper slope weedy, esp.
 with *Crangostis amabilis*,
 much *Pomoea turba*.

1 pintail duck
 1 flock turnstones 15-20
 plovers

Around housing
Euphorbia tirucalli
Codiaeum variegatum
Pemphis acidula
Leucosia taccada
Cocos nucifera
Catharanthus roseus
Fluernis obtusa

Around terminal
Condylina fruticosa (in pots)
Cocos nucifera

+ 44 Mar. 8 - west end of Wilkes Islet, near Kubu Point.
 in ~~old~~ low vegetation
 on coral sand + gravel flat

* 43526 *Peplidium bidentatum* Mont.
 locally abundant not far from beach

5 27 *Boerhaavia repens* L.
 abundant

- * 28 *Heliotropium anomalam* H. & A.
 very common

5 * 29 *Sida fallax* (Willd.) Walp.
 abundant

5 30 *Boerhaavia*
 common

1 31 *Albugo*
 common, parasitic on
Boerhaavia (#43530)

5 * 32 *Portulaca lutea* Sol.
 abundant

5 * 33 *Septeum gasparicensis* Fosb.
 common

5 * 34 *Imbistylis cygnosa* R.Br.
 very common

suffrutescent

prostrate stems up to 1 m.
 long radiating from root crown;
 leaves pale beneath; flowers pink.
 dwarf shrub. stems erect,
 to 50 cm. tall; flowers
 (leaves fleshy) fragrant, corolla
 deeply lobed, white, with
 tiny yellow eye. only one
 kind observed, though
 many plants examined.
 shrub, m. tall; flowers
 clear orange, red center.
 prostrate green stems
 radiating from root crown.
 leaves pale beneath; flowers white.
 changes habit of plant.

stems erect, very thick,
 green, brownish at base,
 flowers yellow, ~~showy~~
 1-2 cm across, petals deeply
 notched; stamens 25-30.
 bunches, at culms and
 spike ascending to erect.
 dense tufts

+ 43539 *Lepturus repens* var. *septentrionalis* Fosb.
common

Mar. 3 - Wake Islet,
in weedy ground around
pier

2 + 36 *Couzya canadensis* (L.) Grong.
occasional

3 37 (*Heliotropium ovalifolium*
common) *polystachyum* (L.) Schult.
Pennisetum setosum (Sw.) L. Rich.
local

Mar. 9 - Wake Islet, north
shore, terminal area

2 39 *Ectocarpus*? *Sphaeralcea*
Polysiphonia
forming a dense ~~felt~~ felt or ~~fun~~
on the reef flat which collects
fine sand.

2 + 40 *Lepturus repens* var. *septentrionalis* Fosb.
on gravel flat back of beach

Mar. 9 - Peale Islet, site
of former Peale Lighthouse

2 + 41 *Lepturus repens* var. *septentrionalis* Fosb.
on disturbed sand and gravel

tufts, spikes ascending &
spreading, on long peduncles.

flowers white.

erect; flowers white.

erect clumps, fruiting
almost past.

small tufts.

dense spreading tufts

1963 Naha I.

Mar. 8 - at a very low tide the erosion ramp and part of the reef flat in front of the quarters area, north coast of Naha I. is exposed.

There is scarcely a distinction between the erosion ramp and the reef flat except that the latter is covered by ~~gravel~~ fur, which may not be able to gain a foothold on the slightly greater slope of the ramp. This is the lowest erosion ramp I have seen - the whole area being almost at base level.

Across it are perpendicular channels about 5-10 cm wide and deep, parallel, running out 40-50' into the reef flat. In the reef flat part these also are lined by ~~gravel~~ felt, clean in the erosion ramp.

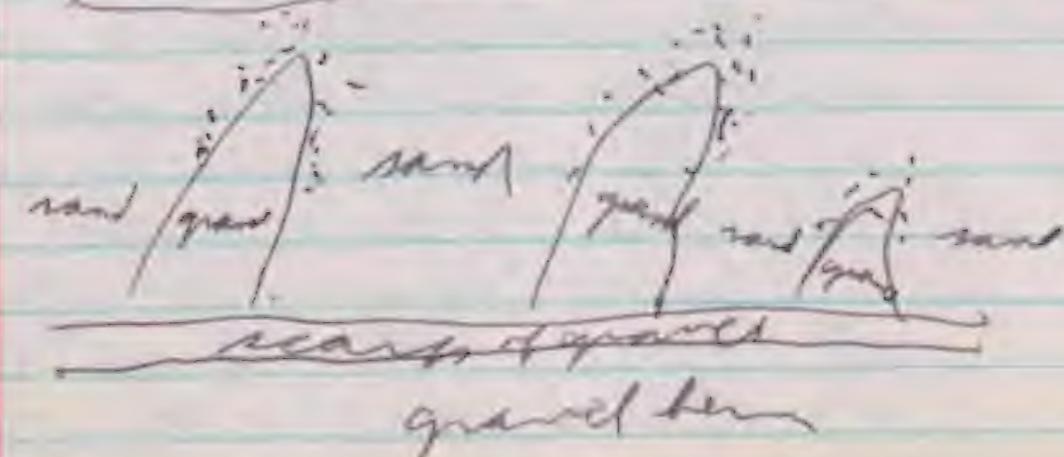
They vary from a few inches to a few feet apart. They are exactly comparable to the channels seen in other reefs (cf. Jerns, Kwajalein, Ulithi, Tracy & Schloenger), etc. but are small and have about cut as deep as they can. Some have gravel in them.

photo
etc.
etc.

photo

The beach is cut back into a higher gravel beach, leaving an abrupt scarp. The material of the beach below is fine sand, that of the scarp is small pebble gravel. As is the beach, been behind it.

At short intervals for a way along this there are masses of pebble material seemingly thrown down on the sand beach, as though a wheel barrow load had been dumped there or some one had pushed down a section of the scarp, but no section had collapsed. There were a few feet to several yards apart and extended perhaps 2 m. or almost the width of the sand ~~to~~ beach. Alexander suggests crop formation patterns, but this seems inadequate.



Mar. 9 Kubu Point

Photos of bite marks on rocks between high and low tides, also of cockroach colony on rock surrounded by water at & high tide.
(coll.)

Some photos of area, and also some of Prites with bite marks, of soft corals, etc (end of bed, roll 4, beginning of 5) (beginning of b + w. roll 5)

South shore Wilkes I. just west of causeway over west channel.

Erosion ramp on old beachrocks (photos) with small "solution pools" (photo)

Surface of ramp at about mid-tide is a mottled bluish (photos + sample) and interior of pools is a pink-gray (photos & sample) dark gray. (photos + sample) collodion free! (Duro cement) of interior of pink pool.

Photos of hot holes.

Three main series of beachrock - pools, mottled surface in most

seaward, abrasion surface sample from next, which is much paler gray. Landward one is very locally developed and not so case hardened (sample) (photo). This is mainly conglomeratic

Walruslet - just east of old lava Marn creek - Very wide series of beachrock beds, at least 40 paces wide from inner edge to where beachrock seems to change almost imperceptably to reef rock. All is conglomeratic.

The reef conglomerate (sample) is much eroded. The actual reef flat is very narrow here.

Photos of beachrock, reef conglomerate, gravel overlying it, huge boulder thrown up (single Prites (?) day).

Tournefortia shrubs killed by storm washing over gravel.

May 9. Wake Islet, south coast n. of Peacock Pt.

Exposed platform of unbedded rock, pale gray except for dark outer margin. This forms a terrace just above high tide. On this are several areas of beachrock - old & eroded. The whole may be beachrock - coarse conglomerate, bedding very obscured & truncated. May be really platform. (photos. bad)

Heliotropium dwarf scrub in open areas back of beach between Turnepotia (finisled hrd. null 5).

Kulua Point - at high tide large parrot fish of several species move around in small schools, several species together, leisurely nipping at coral, making the large marks seen on the rock.

In general the land surface of the island has been almost completely disturbed. In all probability no original vegetation remains, except possibly some *Sesuvium* flats and *Pemphis* scrub along the lagoon margins.

The fact that almost the entire indigenous and spontaneous flora of the island is of an extreme pioneer character causes the secondary vegetation to look rather natural and at least some of the original vegetation types to recur after disturbance.

Of these, a scrub forest of Turnepotia, often with or without scattered *Cordia* and *Pisonia*, is the most prevalent. Its stature varies from 2 to about 6 m. and spacing from closed to open. This has little undergrowth when closed, but the branches are very low and spreading and those of adjacent trees are usually tangled together. Where it is open there is an abundant herbaceous to scrubby growth of many species (ld. with).

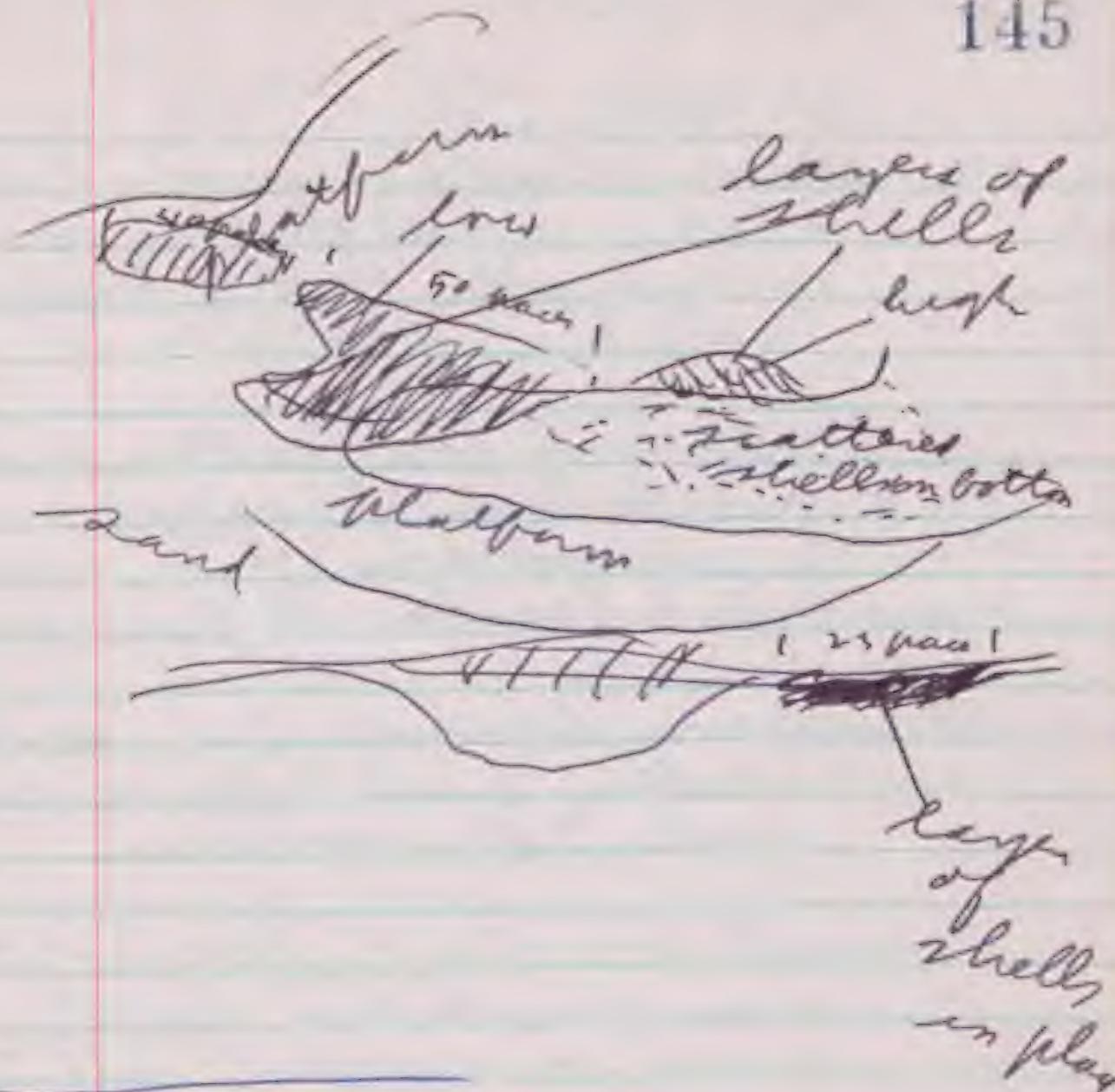
Mar. 9 - Peale I.

Beach rock at about middle of north coast - several beds, partly quarried by waves, and pieces thrown up on beach. Compact larger broken off. (photo) Several thin hard layers landward, then a thin poorly consolidated layer most landward of all. Landward layers are white or very pale.

Tridacna locality.

ctd from p. 143

especially *Lida galax*, *Heliotropium anomalum*, *Pluchea odorata*, and *Septoria* spp., *Baccharis*. *Potulaca lutea* is common locally, and even occurs in closed forest, but not in very vigorous condition. Occasional dead branches of larger *Tournefortia* trees, and even a few whole dead trees, recognizable by lack of bark on trunks and larger branches, persist from the 1952 typhoon, but these do not change materially the aspect of the vegetation.



Judging by the stand of *Tournefortia* seedlings on the ~~the~~ cleared area at the west end of Peale Islet, the type may, under some conditions, reestablish itself immediately after disturbance, without any intervening stages. Where it does not, as around installations, may possibly be due to compaction, or perhaps to competition with such aggressive pioneer as *Pluchea*, ~~baccharis~~ and even *Cordia fragrans* and other herbs.

(ctd. on p. 144)

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1963 Wake

. sampler - ctd. from #125.

24 sand slightly green from algae. sand flat at about 1-1.5 m. alt., base of Flupper Point, Peale I.

25 beach rock from north coast of Wake Islet west of terminal area.

26 eroded beachrock from sample.

27 reef conglomerate from south coast of Wake Islet e. of neck of lavaa mom

28 south coast of Wilkes Islet rims of solution pools on erosion ramp at mid-tide level.

29 surface of erosion ramp, sample

30 abraded surface of old beachrock crust, same place, landward.

31 Wilkes I. samples of landward series of beachrock.

32 rock bitten by fish, Kubu Point

33 old beachrock, Kubu Point

34 Peale I. north coast incipient beachrock from landward of several series of old coarse hardened beachrock.

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35 from under a stone near Japanese monument, Wake Islet

36 on plants

37 clustered on rock that is partly submerged at low tide, swimming easily when brushed into water. (said to be common on rocks in edge of sea elsewhere on island). Kubu Point, Wilkes Islet.

Pandanus tectorius

~~single~~ same tree seen in
1961 & 1963, much larger
than in 1952.

Cenchrus brownii

one plant seen at Japanese
monument 1963.

Cenchrus echinatus

generally distributed in
open disturbed areas

Chloris inflata

still common in disturbed
areas 1961, 1963.

Cynodon dactylon

seen in all areas 1961,
one sizeable patch on Peale
Islet 1963.

Pactylostenium aegyptium

one of the commonest plants
in disturbed areas, 1963.

Digitaria ciliaris

not seen 1961, 1963.

Digitaria gaudichaudii

not seen 1961, 1963.

Digitaria insularis

^{common}
~~seen~~ around old Japanese

garden site 1961, also
seen 1963

Eleusine indica

common in disturbed
places and persisting around
former disturbances, 1963.

Eragrostis amabilis
generally distributed
and abundant in open
places.

Eragrostis praecox
not seen 1961, 1963.

Lepturus gasparricensis

collected in AIG area 1961,
abundant generally on
Wilkes & Peale Islets 1963,
but rare on Wake.

Lepturus repens var. *sept-*

Common generally

Lepturus repens var.

local on Peale Islet near bridge.

Paspalum annulatum

collected at FAA Dock 1961,
not seen 1963.

Paspalum distichum

several patches on Peale I., 1963

Pennisetum polystachyon
Found sterile at 799
Docks 1961, more abundant,
fertile, at same place 1963.

Setaria verticillata
not seen 1961, 1963.

Zorghum dochna var. *technicum*
not seen 1961, 1963.

Zea mays
not seen 1961, 1963.

Cyperus rotundus
^{found noted} collected in old Japanese
garden site 1961, seen there
again 1963, and several
patches on Peall I. 1963.

Cyperus pumilus
collected around old Japanese
garden site 1961, not seen
1963.

Fimbristylis cymosa
generally distributed, 1963.

Fimbristylis dichotoma
Collected at 799 Docks
in 1961, not seen 1963.

Cocos nucifera
a number of small trees now

buildings 1963, none
more than 3 m. tall.

Caladium sp.
not seen 1961, 1963

Dieffenbachia sp.
not seen 1961, 1963

Phyllodendron oxyandium
seen in pot 1963

Phyllodendron undulatum (?)
in pot 1963.

Rhipidophora amea
not seen 1961, 1963.

Cichorium crispum
not seen 1961, 1963 has
undoubtedly disappeared as
~~the~~ the cistern where it
grew seems no longer present.

Rheo spathacea
seen in pot 1963

Pterospermum purpureum
seen in pot. 1963.

Ananas comosus
not seen 1961, 1963

Cordyline fruticosa
seen in pots, 1963, not very
flowering.

Sansevieria
seen in pot 1963

Allium sp.
not seen, 1963.

Crinum sp.
planted around buildings,
not flowering, 1963

Hymenocallis littoralis
not seen 1961, 1963.

Casuarina equisetifolia
commonly planted around
buildings, trees have reached
5 m. tall, 1963.

Ficus carica
still present and fruiting,
2 m tall 1963.

Ficus subginosa
not seen, 1961, 1963

Coccoloba uvifera
still present 1961, 1963; on
Teale Islet a fairly large tree
in 1963.

Boerhaavia repens
common generally, 1961, 1963,
in places very abundant.
Boerhaavia sp. (white fl.)
common generally, with
B. repens, but less common, 1963

Boerhaavia sp.
occasional, apparently inter-
mediate between the others.

Bougainvillea spectabilis
seen around houses 1961, 1963.

Pisonia grandis
still found forest 1961, in
1963 only scattered trees.

Amaranthus dubius
found again in 1961, occasional
locally in 1963.

Amaranthus gracilis
not seen, 1963

Amaranthus viridis
not seen, 1963 (?)

Amaranthus viridis
collected 1963 (very rare) 11-3557
in open ground, Wake Islet.

Lesquerella portulacina
common generally in low

places, especially along lagom margins and occasionally in flats near outer beaches, Mrs. stems unusually red - this true generally.

Portulaca lutea

Common, seen 1961, 1963, especially abundant in cleared area on west end of Wilkes Islet, very tall form, broader ^{and} ~~and~~ branching, light green, no trace of anthocyanin.

Portulaca oleracea

seen in 1961, 1963, occasional around buildings and disturbed areas.

Portulaca ~~lutea~~ *ramosa*

not seen 1961, 1963

Brassica oleracea var. *italica*

not seen 1961, 1963.

Lepidium sativum

Found in 1961, 1963. In 1963 the Lake Peale colony still persists even though the ~~old~~ pond has been bulldozed out of existence. A large colony just back of beach ~~is~~ at Kubu Point, Wilkes Islet, 1961, 1963.

~~Raphanus~~

Raphanus sativus
not seen 1961, 1963.

Tempervivum tectorum
not seen 1961, 1963.

Kalanchoe pinnata

Persisting in IAS compound
1961, 1963.

Baileya sp.

Not seen 1961, 1963

~~Thlaspi~~ *longipes*

Lepidium leucophyllum
~~seen~~ Collected on Peale Islet 1961, well established in same spot 1963, one plant seen also in IAS compound 1963.

Phaseolus vulgaris

Not seen 1961, 1963

Phaseolus sp. (red fls.)

One plant ^{seen} ~~seen~~ 1961, not seen 1963.

Codium variegatum

Planted around houses, 1963, apparently thriving.

Euphorbia cyathophora

Very common in 1961, perhaps somewhat less so and still

general in disturbed place, 1963.

Euphorbia glomerata
Common, locally abundant, 1961, 1963.
Reaches a most unusual stature
and ~~soft~~ woodiness here.

Euphorbia brittonii
Common in recently
disturbed places, 1961, 1963.

Euphorbia pulcherrima
not seen, 1961, 1963.

Euphorbia thymifolia
Collected 1961, not seen 1963.

Pedilanthus amarus
Pedilanthus lithynoides
Collected in 90S compound
1961, seen there 1963.

Phyllanthus amarus
Flourishing colony at 90S
compound, 1963.

Tribulus cistoides
collected Wilkes Islet near
channel 1961, not seen, though
searched for, 1963. Three plants
only seen in 1961.

Ricinus communis
seen planted in 90S compound
in 1961, persisting and apparently
thriving in 1963.

Abutilon glaucum
abundant around open
garden site in 1961, not seen 1963.
seen in near
not seen.

Gossypium
Widespread, locally common,
1961 and 1963.

Hibiscus ornamental hybrid
seen in 1961, not in 1963.

Sida fallax
abundant on Wilkes Islet
1961, 1963, occasional elsewhere.

Hesperis populnea
Planted around housing
areas, and apparently thriving
in 1963, as well as persisting
in 90S compound.

Passiflora sp.
Not seen 1961, 1963.

Passiflora foetida var. *hirsuta*
Established at 90S compound
1961, doing well 1963.

Canavalia papaya
still persisting around
TQS compound 1961, 1963.

Cucumis melo
not seen 1961, 1963.

Cucurbita pepo?
seen at MATS area 1961,
not seen 1963.

Convolvulus sepium
still abundant 1961, 1963,
especially around lagoon
shores, planted for hedges
in housing areas, 1963.

Terminalia catappa
Planted in several places
and thriving 1963, fair sized
tree at TQS compound 1961, 1963.

Eucalyptus citriodora
not seen 1961, 1963.

several casts seen in pots
1961, not seen 1963.

Brassia actinophylla
seen in 1961, not in 1963.

Polyptilon quifoyae
seen planted near a house, 1963.

Anethum graveolens
not seen 1961, 1963.

Apium petroselinum
not seen 1961, 1963.

Chrysophyllum cainito
not seen 1961, 1963.

Catharanthus roseus
seen in many places,
cultivated and established,
1961, 1963.

DB Nerium sp.
seen 1961, not 1963.

Phoenix obtusa
planted around building
1961, 1963.

Sporodes latifolius
not seen 1961, 1963.

Sporodes per caprae sp. brasiliensis
still common 1961, 1963.

Sporodes tuba
generally abundant
except in the most recently
bulldozed areas, 1961, 1963.
Flowers open about dusk,
close mid-morning.

Cordia subcordata

Well distributed, locally common in wooded parts of island, 1961, 1963. Forest of this species and *Pisonia* on Walk Islet destroyed 1963.

Heliotropium argenteum

Common generally, locally abundant forming pure stands ~~in banana~~ on south coast near Peacock Point, 1963. No floral dimorphism observed, all plants seen have dense deeply lobed white corolla with a tiny yellow eye.

Heliotropium walefolium

(var *depressum* ?)

First collected 1961 near Taa Dock, still common there 1963.

Tournefortia argentea

Generally abundant 1961, 1963.

Cobaea scutellarioides

Still seen 1961, not seen 1963.

Stachytapheta jamaicensis

First collected at Taa Dock in 1961, much more abundant in 1963.

Vitis riparia

First collected on Peale Islet in 1961. Well established colony in 1963, plants several m tall!

Capsicum annuum

not seen 1961, 1963

Capsicum pubescens

not seen 1961, 1963

Nicotiana tabacum

seen in 1961, not in 1963, though possibly still persisting.

Solanum lycopersicum

seen in garden in MATS area 1961, not seen 1963.

Pseuderanthemum canthariforme

seen in 1961, not in 1963.

also var. *atropurpureum*.

Passiflora quadrangularis

Some plants still remain south of the main runway on Walk Islet, less in 1963 than in 1961, because of bulldozing. also seen planted around house on north side of islet.

Congea boroniensis

Collected in 1961, common around old TAG compound and TAG Dock in 1963.

Congea ~~borealis~~ canadensis

First collected south of runway in 1961. Common around old TAG compound in 1963.

Lactuca sativa

Not seen, 1961, 1963.

Pluchea odorata

Very common to abundant in disturbed places generally, ~~more~~ seemingly more so, especially on Wilkes and Peale Islets, in 1963 than 1961. Dominant in scrubby vegetation in various places.

Sonchus oleraceus

Not seen 1961, 1963.

Pisonia forest, without a admixture of Cordia, was formerly the most stable and mesophytic vegetation type on the island. The only good area of this remaining in 1953 (also seen in 1961) has been completely destroyed recently by overzealous use of the bulldozer, leaving only bare ground. In a few nearby areas clumps of fair sized Pisonia and Cordia trees remain and if these could be left undisturbed the Pisonia forest is characteristic of coral islands might reestablish itself over a long period of years. ~~This seems~~ That this will be permitted to happen seems improbable, however.

Small areas of Cordia scrub near Peacock Point, observed in 1952 have increased in stature somewhat, but are greatly reduced in area.

Pemphis scrub still lines portions of the lagoon shore, but the area is greatly reduced since 1953

by clearing. Some of them have increased in stature to several m., but are not at all comparable to certain patches of Pemphis forest seen in 1952. Next to the *Tournefortia* scrub forest, Pemphis scrub is the most prevalent reasonably natural vegetation type now remaining on Wake.

A wide-spread vegetation complex on dry atolls in the central Pacific is a scrub of *Lida* fallax with, normally, a strong admixture of *Lepturus* and, where it is a member of the flora, *Heliotropium anomala*. This was alluded to but not emphasized or described ~~by~~ on Wake by Breyer in 1923 (Christopher 1931) and not noticed at all by Fosberg in 1951-1952 (Fosberg 1959). However, two ~~variants~~ of this complex ~~are~~ now occupy small areas. On the cleared area at Kulu Point, on the west end of Wilhe Islet, and in the opening in *Tournefortia* forest nearby, *Lida* or *Lida* and ~~Holoptelea~~ *Heliotropium* form an open to closed scrub, with abundant *Lepturus*, *Portulaca lutea*, and

Bocchavia where the bushes ~~are~~ seasonably do not form a closed cover. This was doubtless present locally in openings before the clearing which was done prior to 1951. Just west of Peacock Point, back of the south coast of Wake Islet, are openings and thin places in the *Tournefortia* scrub and sand forest that are occupied by an open to closed dwarf scrub of *Heliotropium anomala*. This may simply have been missed during earlier visits, or it ~~was~~ may have developed in cleared spots resulting from the 1952 typhoon. This area was not visited in 1953.

Sesuvium flats now occupy perhaps more areas than ~~as~~ a decade ago, being still present on wet ~~soil~~ muddy or sandy lagoon margins and also ~~soil~~ coming in where excavation has reached the water table, as in the brackish pond in the triangle of the ~~sawcamps~~ surrounded by runways

and taxi strips opposite the terminal building. The plants form a succulent bright green mat in low wet places, ~~but~~ but are more scattered in exposed beach ridge areas ~~elsewhere~~, or other parts of the atoll.

Roadsides and other recently cleared areas are mostly covered by a vegetation of annual gramine and other herbs, especially *Cenchrus edulis*, *Eragrostis amabilis*, *Dactyloctenium aegyptium*, *Cleusine indica*, and several *Euphorbia* species. Such areas, if left ~~alone~~ without further disturbance for a while, may change to an open to closed scrub of *Pluchea odorata*. Where traffic is heavy there persists a sparse "lawn" of dwarfed plants of ~~the~~ *Dactyloctenium*, *Cleusine*, *Timbostylis* and ~~other~~ other herbs.

~~before~~ During the present visit the weather had been sufficiently dry that ~~most~~ much of the herbaceous vegetation ~~was~~ was

practically dry, though by no means as mud was in May 1952. Many leaves have recently fallen from the *Tournefortia*, but not so many as to give a dry aspect. The leaves of *Cordia* and *Pisonia* are predominantly still green. A few of the *Pisonias* were coming into flower. Fruits, and a few flowers were seen on *Cordia*.

Evidence of a recent storm, at least of very high waves, were seen on both north and south coasts in the form of large areas of pale gray to white, presumably recently uncovered beachrock, white stirred up gravel, and dead shrubs at the top of the beach and just back of it. The airforce officer present said that the period of high waves was in October.

At the base of Flapper Point, opening westward toward the mouth of the lagoon, is a shallow, narrowly triangular inlet, dry at low tide. The landward side of this is lined by a somewhat irregular but not rough erosion ramp, the other side by a gravel and sand beach. The steep platform in which the erosion ramp is cut extends at about high tide level across the head of the inlet, ~~and~~ to and along the other shore of the point. The general level of the surrounding dry land is 1.5 to 2 m. above low tide level.

On the north side of the lower part of the inlet at the top of the erosion ramp, is a narrow thin beach of sand and shells lying on the upper part of the ramp. At the top of this a small cliff, about 70 cm. high is cut into the bank. This ~~banks~~ cliff exposes a layer, about 50-60 cm. thick of ~~about~~ closely packed *Tridacna* shells, overlain

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by a 10-20 cm. layer of sand and small gravel, containing a few shells. The lower part of the inlet is completely covered by similar shells, these much blackened. At the extreme head of the inlet is a similar but much thicker tract of shells, not so much blackened. This extends, with some interruption almost to the opposite shore of the point, and is at least 30 cm. thick in places. Up on top of the bank on the south side of the inlet is another similar tract of *Tridacna* shells. In the material of this bank are also scattered shells.

Nothing similar to this deposit of *Tridacna* was seen anywhere else on the island. The concentration of shells is much greater than occurs anywhere ~~other~~ living on the reefs. The occurrence suggests ~~the~~ deposits seen in the Tidmotus where the clams are an important item of food and the shells accumulate on the lagom bottom in

shallow water, except that here the layer is at least a meter above low tide level. Valve ~~bank~~ never had aboriginal inhabitants, so far as known. The suggestion that the shells may have been from clams eaten by the Japanese soldiers during the war is made less likely by the presence of the layer of sand and gravel overlying the *Tridacna* layer where it is clearly in place.

No artifacts either of aboriginal or Japanese culture were found, and no systematic mode of breakage of the shells as might ~~have~~ be expected if they had been opened. However, this species of *Tridacna* is easily opened by cutting the muscle through the hole at the end of the hinge. Since we are not trained archeologists it is very possible that significant artifacts or other indications may have been overlooked. It would be of great interest to have the locality examined by an archeologist.

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before it is lost to the
bulldozers.

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Mar West Molokai - south coast shallow water is red with mud.

Shallow water along east Molokai coast is slightly muddy but not red and not nearly as muddy as the west part.

Parai is still red and has Kanepu forest surrounded by wind break.

Wooded area on mountain extends well down the slopes into the upper part of the gulches. Shallow water around north coast is red.

Very little mud along West Maui coast. South end grass covered but is rather green, more so than usual. Scattered Sackia or Prosopis trees well up the slope.

Ton on s. coast of Ithomas has considerable water.

for
P. merianae

W. up
d. on
1. up hill

West Maui - Iao Valley

On trail up ridge above lookout is a very good stand of *Rhus javanica*, mostly tall shrubs but reaching 6-8 m. ht. and 10 cm dbh.

Upward a few Metrosideros and Psychotria (perhaps close to *P. hawaiiensis* as ~~petiolate~~ petioles are several cm long) has strongly obovate leaves. But thyrses not complex enough for *P. hawaiiensis*. Forest on ridge top becomes less dominated by *Rhus* and more by *Metrosideros manuka*.

Ground is covered by a dense layer of *Nephrolepis*, *Microlepia*, occasional *Hedera*, *Sphagnum*. *Oplismenus* covers ground in ~~top~~ small openings. Seedlings of *Rhus* common.

No shrub layer except occasional *Grewia* and young *Rhus*. *Cordyline* common on slopes, rare on ridge.

Only exotic guava, *Crinum* diffusum, *Asplenium nidus*, *Ischaemum*

Many good patches of native forest across canyons on lower slopes, upper slopes and cliffs with thin shrubby vegetation or grass. Some vertical cliffs and vertical valleys really bare.

Beautiful amphitheater beaded valleys. Waterfalls but mostly dry in fine weather.

No wings whatever on veins of *Rhus* leaves. Leaves minutely pubescent, young growth red.

Road past Waikae to Kahakuloa - mostly guava scrub and grass. Photos of Pali Kakekeli, of Pun Koae, and Kahakuloa.

Artemisia cf. *australis* or *manicata* on cliff across the bay from Pun Koae. Lots of boulders at Kahakuloa.

Haleakala - Patch of *Lepidium hastata* still in good shape, flowering.

Pine planting just below entrance to park has been seriously damaged, apparently by a windstorm, as in area examined about $\frac{1}{3}$ of trees have been ~~broken~~ tipped in one direction, about $\frac{1}{4}$ completely ~~torn~~ fallen. Of these, some, broken off at root crown, are completely dead, others partly still rooted, are still green.

n.e. of Ulupalakua, coastal slopes ~~near~~ of Makawao. Open abandoned fields covered by dense growth of *Rhipsalis cernuum*, *Paraphlomis brachycarpa*, *Nephrolepis exaltata*, some *Ipomoea*, and in thinner place *Centella*, *Pitcairnia*, *Thaumatophyllum*, *Cassia leschenaultiana*, *Cyperus*.

In ravine edges some *parnassia* in ravine wood of Indian cotton l. grasses, with a little *Eugenia cuminii*, *bukin*, *pandanus*

March 10 - Iao Valley

43542 *Digitaria graminis*
common in thin scrub forest

March 10 - ~~south~~ southeast of
Kahahulu on ~~coastal~~ coastal bluffs.

43 *Grevillea banksii*
forming a small forest,
evidently naturalized

March 10 - 2½ miles east of
Kihei

44 *Pistia stratiotes*
covering the surface of
water in roadside ditch.

March 11 - 2 mi. n. e. Lower
Paia, Hookipa Park

45 *Heliotropium anchusaefolium*
common on low coastal bluffs

46 *Lysimachia carolinianum*
locally common on terrace
above high tide level,
probably wet by spray

Wailea Valley seems to be one
of the finest and least disturbed
at west Maui. Ridges west
of Wailea show dead trees
and signs of bog development.

inlet reefs developed along
s. coast of S. Molokai - very irregular

500 m.

near Pun Olai

300 m. small tree or shrub 4 m. tall,
flowers coral red.

lower parts of leaves
thick and spongy.

10 m. decumbent; flowers purple
arching dwarf shrub;
leaves fleshy; flowers
lavender, corolla limb
patent; fruit scarlet, fleshy.

broad fringing reef
lower slopes of all ridges
grassy with some brush -
perhaps lower 4/3 - lawn
bottom wooded. Keawe forest
extends some distance inland
borders Kauakakai. Mangrove
fringe west for several miles west
from Kauakakai.

Ideas for investigation
of re-vegetation on volcanic
material:

Long term program of
observation - cooperative bet-
w NPS, Japanese Coop., USGS & PSB,
and Univ of Haw

To be initiated on Jap Amer.
Coop funds with under-
standing that if these fail,
continuing observation will
be carried on by NPS + UofH.

Personnel - Univ Haw.

autecology
synecology

? geomorphology - when
? vegetation geomorphology - when

Areas of investigation -

Hawaii Volcanoes Nat. Park + vic.

Haleakala Nat Park

Lassen Nat Park

Crater Lake Nat Park

Craters of the Moon Nat Park

Katmai Volcano.

Investigations to be initiated
in fields of autecology,
synecology, dynamics.
All of them to be related
to geomorphology.

Autecology - marked
plants to be observed,
measured and measured
repeated at intervals to get

rates of growth and
annual or seasonal increments.
Ratios of shoot to root
dry weight for principal
species to be determined.
Using growth increments
and C/L ratio, rough
net productivity to be
determined.

~~Floristic~~ - ecological

Floristic-ecological investi-
gation - apply B-B or simila
system using complete
floristic relevés.

Measurements of environ-
mental factors - Soil moisture,
isolation, of drainage,
depth, texture of soil,
organic matter, exchangeable
bases, pH, etc.

Dynamics - permanent
plots and transects to be
established, photo points
to be established, observation
made seasonally and
at regular intervals.

Population dynamics of
complex flora.

Invasion behavior of exotics

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Mar. 13 - Honolulu

University Campus

43547 *Wedelia trilobata*
planted as ornamental
ground cover

✓ 48 *Jatropha g. hastata integrifolia* Jacq.
plant as an ornament

Mar. 19 - 2 miles north of
Turlock, Stanislaus Co. Calif.
in weedy area in orchard

✓ 49 *Claytonia perfoliata*
common

✓ 50 *Saxifrage amplexicaule*
occasional

✓ 51 *Lonicera japonica*

✓ 51 *Amsinckia*
abundant; has in
recent years become one
of the most abundant
weeds in the region, formerly
common only locally.

3 52 (conf.)
very abundant in old laundry.

✓ 53 *Lonicera japonica*
planted many years
ago in yard, has not
spread but is a healthy plant.

prostata, flowers yellow,
mostly not flowering
at this season.

shrub 2.5 m. tall;
flowers bright rose-
crimson. latex almost
clear, not abundant.

flowers pinkish white.
(probably not native here
but naturalized from
plants brought into
garden many years ago
from coastal California)
corollas purple.

seed, corollas orange

tangled climber, sterile
at this season.

Mar. 19 - 10 miles ~~south~~^{west} of Modesto, on Mafes Ranch, east of San Joaquin River, in shallow very alkaline depression in pasture.

43554 *Erodium*
4 abundant around edges of
2 55 *Plantago*
locally abundant
3 56 *Allocarpha*
locally abundant
1 57 *Orthocarpus*
occasional, more abundant in slightly higher spots.
1 58 *Allium?*
occasional

1 59 *Brodiaea capitata*
occasional
1 60 *Senecio*
occasional in edges of
3 61 *Sepidium*
locally abundant
5 62 *Baeria*
abundant, forming masses of color
1 63 (rich.)
rare

25 m.

flowers purple; fruits conspicuously erect, rather fleshy
prostrate, flowers white to bluish white
corolla tube white, gale reddish, lower lip sulphur yellow.
crushed stems have a rather disgusting odor, not quite like garlic;
flowers white.
flowers violet
disk yellow.

flowers bright deep chrome yellow.

May 19 - $\frac{2}{3}$ miles n.w. of Vernalis, west of San Joaquin River, in weedy railroad right-of-way 25m.

- 43564 *Amsinckia*
common
- 6 65 *Adonis*?
occasional
- 7 66 *Lepidium*
common to abundant
- 6 67 (way)
locally abundant

May 19 - $3\frac{1}{2}$ miles n.w. of Vernalis, west of San Joaquin River, in weedy railroad rgt.-of-way 25m.

- 6 68 *Amsinckia*
locally abundant
- 5 69 *Amsinckia*
locally abundant
- 7 70 *Amsinckia*
locally common, with nos. 43568 and 43569

flowers range
stems spreading,
almost prostrate,
flowers white.

erect, flowers white.

flowers showy, orange.
flowers yellow &
flowers orange

March 19 - Maper Ranch, 1 mile west of Modesto -

An alkaline depression or vernal pool in a pasture is marked at this season by masses of Baeria that show up as solid deep cream yellow irregular patches. The vegetation of the pasture surrounding the depression is dominated by Erodium sp. but has considerable grass and various other species.

The depression itself is a mosaic of vegetation with patches of bare soil encrusted with white alkali. Baeria, Plantago, Allocarya, and Lepidium form pure or almost pure patches, as well as mixtures. The plants collected were only the obvious species - the *victoriorum* plant ~~is~~ is a rare one that was collected by accident mixed with the Baeria. *Busella* is common.

This area is north of and immediately adjacent to the Maye Road, just east of Maper Ranch gate no. 2. The area must be at least 4-5 acres, possibly more. It is quite irregular and

in the time available could not be thoroughly looked over - some extension westward was noted and doubtless there are other such areas.

For conservancy purpose someone should go down there and look it over at leisure - preferably now while the plants are still in flower. A wide survey of the general area should be made as possibly there are much better sites than this.

The area is presently grazed, but apparently not too heavily, at least at the moment.

Later Land near the River on both sides and to Tracy has fine black soil. Is doubtless drained tile marsh.

Could it be that this is more subject to alkalization by irrigation than sandy areas farther away from river?

Could it be that "black alkali" ~~Na₂SO₄~~ (Na₂SO₄) is result of reaction with H₂S by NaCO₃ and in these marsh soils & subsequent oxidation?

May 2 - flight S. F. to Wash.
 The Sierra south of Mono Lake present a tremendous rugged field of peaks, much more impressive than to the north. Mono Lake is still a large lake, but Owens Lake is much smaller. Mt. Shasta is visible in the far distance, very white. The higher peaks of the Sierras, esp. those to the south have considerable snow, but at middle to fairly high it appears to be very light.

The Nevada ~~mt~~ mountain ranges, especially southern Nevada, have snow down almost to the base, even the small clumps of hills. This becomes a less eastward, when only the higher ranges show any snow.

Several dry lakes in eastern Nevada and perhaps western Utah - one at least has considerable water right now. Could be a permanent lake - Carson Sink? (about 45 min. out of L. J.)

Several black spots may be lakes.

Snow becomes more abundant eastward, but at higher altitudes only. Many snow-covered ranges visible to north, not many to south.

Just west of Grand Junction, Colo., is an extraordinary arrangement of canyons, tributary to the upper Colorado River. This is cut like a maze, into a sedimentary block and all of the canyons finally converge and the outlet is through a narrow portal. Deserves further exploration - first on topo-maps, then on the ground.

The country west of the Mississippi, from 33°S looks generally a dull brown. Little green shows except rarely where there is an irrigated field in the deer.

As the Mississippi is approached, a black color becomes more prevalent, representing forested or bushy areas.

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TO:

Wake Island 3/9/63

1962

STATEMENT OF SUBSISTENCE, QUARTERS
AND LAUNDRY SERVICE FEES DUE

TO: DR. E. R. VOSBERG

ORG: COSTAN COASTAL

DOMESTIC

Federal Aviation Agency

Domestic Services Section, Wake Island

For meals and lodging furnished on the dates specified below:

March 6, 1963	:	Dinner	\$ 2.00
March 7 thru 9, 1963:	:	3 days @ \$6.50	19.50
March 10, 1963	:	Brkfst	1.00
			<u>\$22.50</u>

ONE DAY'S CHARGES CONSISTS OF THE FNG:			
BRKFST	\$1.00		
LUNCH	1.25		
DINNER	2.00		
LODGING	<u>2.25</u>		
			<u>\$6.50</u>

Payable in cash or by check to order of FEDERAL AVIATION AGENCY.
Make payment at Island Manager's Office, Second Floor, Terminal Building.

Pd
3/9/63
R.L.

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